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THE MEETING AT CHICAGO.

The Eighth Annual Meeting of the American Gas Light Association was held at Chicago, Illinois, on the 13th, 14th and 15th of October. There was a large attendance, although there is no doubt that there would have been more in numbers present were it not for the fact that this is "presedential year."

The meeting was presided over by the President, Mr. William H. Price, of Cleveland, whose excellent practical address will be found in another column. All of the meetings were well occupied, in that strict attention to the business before the Association which is becoming more and more a characteristic of them, and the papers read and discussed will prove most valuable contributions to the literature of the gas business. The great advantage of continuing the meeting for three days, instead of two, was fully demonstrated, as it gave plenty of time for the discussions which are so important in setting forth all the phases of a question which, when presented in a paper only, can only be presented from a single point of view. In addition to this, it leaves plenty of time for sight seeing, excursions and mutual personal comparison of notes among the members.

The first paper read was by Mr. Theobald Forstall, of New Orleans, La., and elicited the closest attention. It was evident at once that he was dealing with a subject in which most of the members present had a personal interest, and the manner in which Mr. Forstall treated the subject showed that he was relating facts in a by no means limited personal experience of his own, and that his method of obtaining those facts had been most thorough, systematic and careful, involving much labor and careful study, as well as a complete trial of most of the expedients that have been devised to remedy the difficulty of stopped ascension pipes.

The subject was a homely one, but the difficulty involved is one of the first to be met with in taking gas from the retort to the holder. No synopsis of the paper would do it justice; and when we bear in mind that all the trouble and labor necessary to acquire the tabulated data given had to be performed in a tropical climate, we cannot but feel that many of the reasons assigned by others of us, much more favorably situated, for not collecting facts and giving them to the profession sink into insignificance, and utterly fail to justify us in our failure to do our part in developing the science of gas making.

The reading and discussion of this paper occupied the first day until the middle of the afternoon session.

The next paper was by General A. Hickenlooper, Manager of the Cincinnati Gas Light and Coke Company, upon the subject of "Mechanical Stoking." It was an exhaustive survey of the whole field of efforts in this direction. Beginning with the efforts of Maiben, of Perth, in 1814, and Clegg, in 1816, in the direction of rotary retorts, and following on to the present time, he gave a clear, succinct account of the efforts made by many able and distinguished men to substitute mechanical appliances for the exhausting and hard manual labor required in charging and drawing retorts.

He then proceeded to give the results of his personal experience with the Ross mechanical stoker which has been in operation for over a year in the Cincinnati works with most satisfactory results. The simplicity, efficiency, and durability of the machines were shown to have been clearly demonstrated, while the saving in the cost of labor was very large. These machines are ordered fer the Manhattan works, in New York City, and also for the works in New Orleans. Discussion on the paper was continued on the morning of the second day. It is extremely gratifying that an American should have the honor of inventing and putting into practical operation the most successful machine of the kind yet brought to the notice of the public; and, in fact, it would seem to leave very little to be desired. These machines were explained in detail, and illustrated, in this Journal of June 2d, 1880.

The third paper read was also one that dealt very largely with facts obtained from personal experience, and was by Mr. Geo. G. Ramsdell, of Vincennes, Ind., on "Gas Engines." It embodies results obtained from the use of these engines up to as high as 17 horse power, and clearly shows how large a field is just opening for the use of gas as motive power. The importance of this branch of the gas business has been often urged upon our readers, and we feel confident that it is becoming more and more appreciated every day, but here are given the figures showing exactly what the cost of running was. These data will be sufficient for any one to make his own calculations to suit his own locality.

Other papers were read upon "Furnaces," "Selling Gas according to its Illuminating Power," "The Heating Power of Gas," and a very interesting paper by Mr. W. H. Pearson, of Toronto, on the results obtained in his company by the use of the Lowe process for making water gas. The discussion upon this paper was marked by the best of good nature, although it was evident that there was some difference of opinion among the members as to the practical results attainable by the process.

In the evening of the second day a lecture was delivered by Mr. George Sheppard Page, upon "Coal Tar and its Products." Aside from being very interesting, the lecture was extremely instructive, giving a very clear idea of the magnitude of the business resulting from the proper treatment of coal tar and ammoniacal liquor. The conclusion to be drawn from the figures given was that coal tar is of such importance that should the gas business be discontinued it would still be necessary to distil coal for the tar products.

Another point which seemed very clearly shown was that the importance of the residual products in the gas business has never been fully appreciated in this country, and that an effort should be made to increase the value of these residuals to the gas companies, by stimulating the manufacture of coal tar and ammonia products at home instead of having our markets supplied by foreign importations.

Many of the members were accompanied by ladies, and they were cordially invited to be present at Mr. Page's lecture; and they were, no doubt, quite astonished to find that the many gorgeous silks, etc., which were displayed before them were indebted to the black and dirty tar well for their brilliancy.

Headquarters were at the Grand Pacific Hotel, and the meetings were held in one of the large halls of the hotel. Every provision was made for the comfort, convenience and enjoyment of the members by the proprietor, Mr. Drake, and never before have the members been so generally well satisfied with their accommodations. Among other attractions supplied at the Grand Pacific was the electric light in use upon the two lower floors of the hotel, in the rotunda, the reading room, the halls and dining room, and in the ladies' ordinary where the meetings were held. This gave the members a practical opportunity to see "how the thing worked"; and while the light as used there is probably as well arranged, steady and successful as any, it was not generally thought to be a very serious competitor with gas either in quantity or quality. In fact if any were disposed to be timid about its probable adaptability to replace gas, they were reassured and satisfied when they saw exactly what the light was in its best estate. It would occasionally blink, sometimes go out, and quite often warn one of its presence by the sputtering and hissing noise which usually, from time to time, is produced by it.

The third day was one long to be remembered. Under the direction of Mr. E. T. Watkins, President Chicago Gas Company, a most busy and delightful days' entertainment was provided, consisting of a visit by special train to the stock yards and the packing house of Messrs. Armour & Co., where the facilities for putting pork into the market was seen in practical operation. The details of this visit would scarcely be contained in a volume. After returning to the city carriages conveyed the members to the North Station of the Chicago gas company's works, which were rapidly inspected, and in the meter room of which a most substantial lunch was spread to which ample justice was done by all. After a drive through Lincoln Park, the Exposition was visited, and then the party driven to the South Park, and thence to the hotel. In the evening the members were again placed under obligations to the boundless hospitality of the Chicago Gas Company, at a banquet, presided over by Mr. Watkins, which, for excellence in every particular, it would be difficult to find an equal. As the evening wore on a few of the party were obliged to go and catch a train, and bidding farewell, they parted with regret. The festivities were continued to a later hour, the usual toasts were responded to, and all arose from the banquet feeling that truly Chicago was a great place for holding an annual meeting. The Eighth Annual Meeting will be long remembered as one of the most successful and one of the best yet held. To Mr. Watkins the Association is under many obligations for his successful efforts in bringing about this result. It was voted to hold the next meeting in Boston, and, no doubt, that will be the largest meeting ever held by the Association.

Are High Yields Economical?

We call especial attention to the following article from so distinguished a source as the pen of Mr. George Livesey. The point made is a very clear one, as well as a very important one; and we would urge our gas makers to comply at once with Mr. Livesey's request to make an exhaustive set of experiments on this subject and to publish the same. We shall gladly give the largest amount of space to the result of such workings, and trust that the American gas makers may be able and willing to throw some light upon the subject.

[Communicated Article to the London *Journal of Gas Lighting*.]

IS A HIGH YIELD OF GAS PER TON OF COAL CARBONIZED AN INFALLIBLE TEST OF GOOD MANAGEMENT?

By Mr. George Livesey, Secretary and Engineer of the South Metropolitan Gas Company.

The interesting articles by Mr. H. Leicester Greville, on the amount of light naphtha in coal tar and its illuminative value, which were recently published in the *Journal*, invite attention to a question of some importance to gas managers and to gas companies and corporations owning gas works. It seems to be assumed that a high make of gas per ton of coal is indisputable evidence of good working, reflecting credit on the manager, and bringing profit to the undertaking. It is, therefore, one of the usual things for the chairman at a meeting of the shareholders to make a great flourish of trumpets over a make of, say, 10,500 feet of gas per ton of Newcastle coal carbonized; but he never tells his audience the cost at which this result has been attained—probably supposing, and certainly leading his hearers to suppose, that the increased yield has been obtained without any increase of cost whatever.

If the increased yield is brought about by the prevention of leakage from the retorts, or the removal of the dip, or the prevention of oscillation and the working with a steady level gauge, or by improvements in charging, or more regular heats, while all other conditions remain unchanged, the additional make per ton—provided the illuminating power be not reduced—is a clear gain. Supposing, however, that the additional make is the result of harder firing—which is usually the main element in producing an enlarged make of gas—there is not a clear gain by any means.

It is well known that when the economical maximum is attained the cost of going beyond that point increases in a very rapid ratio until the gain, however great, is more than counterbalanced by the cost of obtaining it. This is strikingly illustrated in the speed of steamships, and the same principle must apply to gas making.

If an extra 500 feet of gas per ton of coal carbonized is obtained by higher heats, experience shows that the quantity is increased at the expense of the quality. It appears from Mr. Greville's investigations that the quantity of light naphtha found in the tar is very nearly sufficient–if entirely absorbed by the gas—to add one candle to the illuminating power, or to prevent its reduction to that extent. As this, however, does not appear to be the case, it is probable that high heats have but little effect in transferring the light naphthas from the tar to the gas. If they were transferred, a valuable constituent would be taken from the tar, thus reducing its value, and causing a loss on the tar approaching, if not quite equal to the gain on the gas. "You cannot eat your cake and have it."

Seeing that an extra 500 feet per ton is an item that stands out clearly, whilst the items on the other side are to a great extent wrapt in obscurity, and of unknown value, it is not surprising that the one should have been brought prominently forward and the others overlooked or forgotten.

It is very desirable that some attempt should be made to ascertain the economical maximum make of gas per ton, and to this end the following *pros* and *cons* may be suggestive, and lead to the necessary experiments that should be undertaken to clear up the doubtful points. It is quite open to any one to set his value on the various items in the annexed statement:

Statement based on the Comparison of 9,800 *Feet of* 15½*-Candle Gas against* 10,300 *Feet per Ton of Newcastle Coal in London.*

Estimated reduction of [illuminating power at least half a candle, requiring 3½ per cent. of cannel, producing 30-candle gas, to make up the deficiency of light, the extra cost of the cannel and the diminished value of its coke will add from 10d. to 1s. per ton to the cost of coal, say	0s.	10d.
Extra fuel, estimated at least 10 per cent	0	2
Less tar produced, estimated one gallon	0	2
Increased wear and tear of retorts, and trouble with stopped pipes, say	0	1
	1s.	3d.
Deduct—		
An increase of 5 per cent. in the make per ton is equivalent to a saving of 5 per cent. of carbonizing labor, which, according to Mr. Field, is rather less than	2d.	
5 per cent. less of retort-houses and retorts for the same amount of work effects a saving of plant, which at 10 per cent. interest amounts to	1d.	
	—	0s. 3d.
Difference		1s. 0d.

If this is correct, it appears that the net cost of producing an extra 500 feet of crude gas is one shilling, the said gas being not worth more than 6d. in the retort house.

Can this be even approximately correct? If so, these vaunted high makes per ton, where cannel has to be used to keep up the quality, are a great mistake, and even where the reduction of quality is of no consequence, and cannel is not required, the 6d. worth of gas is not by any means obtained for nothing.

The object of the writer for many years has been to produce, with the smallest amount of cannel, gas of the required quality of 16 candles, being content with a make of 9800 feet per ton. Experiments are about to be made for the purpose of ascertaining the point at which it ceases to be economical to increase the make per ton; and it may be found better to produce only 9500 feet or so without cannel, than any larger quantity with the addition of that expensive article. The result of those experiments shall be placed at your service, and if others will give to your readers the benefit of their experience on this important question, even if it goes to prove that the writer is altogether mistaken, no one will be more pleased than he to see a satisfactory conclusion take the place of the present uncertainty.

[Official Report.]

Eighth Annual Meeting of the American Gas Light Association.

Held at Chicago, Ill., October 13, 14, and 15, 1880.

Morning Session—Oct. 13.

The meeting was called to order at 11 A.M., the President, Mr. W. H. Price, in the Chair.

THE ROLL.

During the meeting the following members were present:

Honorary Member.

G. Warren Dresser, C.E., New York City.

Active Members.

Allen, A. L., Poughkeepsie, N. Y.	Andrew, J., Chelsea, Mass.
Allyn, H. A., Cambridge, Mass.	Averill, A. T., Cedar Rapids, Iowa.
Battin, Isaac, Albany, N. Y.	Barret A. H., Louisville, Ky.
Brown, T. R., Philadelphia, Pa.	Beal, W. R., New York, N. Y.
Butterworth, T., Rockford, Ill.	Burtis, P. T., Chicago, Ill.
Borgner, C., Phila., Pa.	
Cartwright, W., Oswego, N. Y.	Cartwright, H., Philadelphia, Pa.
Cabot, G. D., Lawrence, Mass.	Cowing, J. H., Buffalo, N. Y.
Coggshall, H. F., Fitchburg, Mass.	Curley, T., Wilmington, Del.
Collins, C., Chicago, Ill.	Cushing, O. E., Lowell, Mass.
Clark, Jr., E. W., Phila., Pa.	Crafts, D. W., Northampton, Mass.
Diall, M. N., Terre Haute, Ind.	Denniston, W. H., Pittsburg, Pa.
Dwight, G., Springfield, Mass.	
Frost, W. H., Plymouth, Mass.	Forstall, T., New Orleans, La.
Fuller, H. M., Greenville, Mich.	
Gardner, Wm., Pittsburgh, Pa.	Goodwin, W. W., Phila., Pa.
Gerould, H. T., Cairo, Ill.	Gates, F. W. Hamilton, Ont.
Hickenlooper, A., Cincinnati, O.	Helme, Wm., Phila., Pa.
Hookey, G. S., Augusta, Ga.	Hendly, J., Beloit, Wis.
Howard, L. J., St. Louis, Mo.	Hopper, Thos. C., Phila., Pa.
King, E. J., Jacksonville, Ill.	
Ludlam, E., Brooklyn, N. Y.	Littlehales, T., Hamilton, Ont.
Miller, W. H., Columbus, O.	McElroy, J. H., Pittsburgh, Pa.
Merrifield, P. S., Troy, N. Y.	Moses, G. W., Chelsea, Mass.
McDonald, Wm., Albany, N. Y.	
Neal, G. B., Charlestown, Mass.	Odiorne, F. H., Boston, Mass.
Page, G. S., New York, N. Y.	Parritt, W., Bloomington, Ill.
Pearson, W. H., Toronto, Ont.	Price, W. H., Cleveland, Ohio.
Patton, J. D., Hicksville, O.	Prichitt, S., Nashville, Tenn.
Pratt, J. C., Jamaica Plain, Mass.	
Raynor, C. H., Adrian, Mich.	Richardson, G., Wilmington, Del.
Rogers, J. F., Jam. Plain, Mass.	Rich'dson, A. W., N. Adams, Mass.
Rollins, J. H., Worcester, Mass.	Root, F. M., Connersville, Ind.
Rice, E. S., Logansport, Ind.	Ramsdell, G. G., Vincennes, Ind.
Scott, I. R., Waltham, Mass.	Spear, J. Q. A., Dorchester, Mass.
Slater, A. B., Providence, R. I.	Starr, J. M., Richmond, Ind.
Sommerville, J., Indianapolis, Ind.	Smith, M., Wilkesbarre, Pa.
Spencer, R., Burlington, Iowa.	Turner, T., Charleston, S. C.
White, W. H., Brooklyn, N. Y.	Watkins, E. T., Chicago, Ill.
Wood, A. C., Syracuse, N. Y.	Wood, Gideon, New Bedford, Mass.
Weare, C., Marshalltown, Iowa.	Weber, A., New York, N. Y.

The President—The first thing in order is the reading of the minutes of the last meeting.

Mr. Slater—I move that the reading of the minutes be dispensed with.

Carried.

The President—The next business in order is the reading of applications, notices, and reports for new members.

The Secretary—I have the applications of a number of gentlemen for membership in this Association. They are accompanied by the usual fee, and the gentlemen have the necessary qualifications. The names of the applicants are as follows:

D. D. Flemming, Jersey City, N. J.
E. S. Rice, Logansport, Ind.
C. Collins, Chicago, Ill.
E. G. Spaulding, Buffalo, N. Y.
G. W. Moses, Chelsea, Mass.
L. J. Howard, St. Louis, Mo.
A. T. Averill, Cedar Rapids, Iowa,
E. J. King, Jacksonville, Ill.
G. S. Page, New York City,
H. M. Fuller, Greenville, Mich.
E. W. Clark, Jr., Philadelphia, Pa.
C. Weare, Marshalltown, Iowa.
C. Borgner, Philadelphia, Pa.
A. Weber, New York City.

These applications have all been laid before the Executive Committee, and they recommend the election of the applicants.

The President—What course will you take with these applications?

Mr. Denniston—I move that the Secretary be authorized to cast the vote of the Association, unless there is objection.

Carried.

Major Dresser was appointed teller.

The President—If there is no objection the Secretary will, in compliance with the request of the Association, and in accordance with our usual custom, now proceed to cast the ballot of the Association for the gentlemen whose names have just been read.

The Secretary then cast the vote of the Association for the gentleman named, and they were declared by the President to be unanimously elected members.

The President—According to the rules of the Association, the gentlemen just elected are requested to rise and be presented to the Association.

Mr. Burtis—Article VIII. of our Constitution provides that new members, when elected, shall sign the Constitution of the Association. As the members elected this morning are all present, I think it would be entirely proper that they should come forward and sign the Constitution now.

The President—It is suggested that, inasmuch as the signing of the Constitution would make some confusion, the newly elected members shall take occasion to do so during the recess.

The Secretary—There are a number of the older members who have neglected to affix their signatures to the Constitution. They will oblige me by coming forward during the recess and signing the same.

Mr. Cabot—Would it not be well for the Secretary to read the names of those members who have not signed?

The Secretary—It would take some little time to ascertain who they are, and perhaps we had better defer that until we have disposed of our regular order of business, or until the Secretary can ascertain the names, so that no delay will be occasioned.

The President—You have provided in your order of arrangement for the transaction of business that the president shall deliver an address. I have prepared some remarks which I will now proceed to read.

THE PRESIDENT'S ADDRESS.

Gentlemen of the American Gas Light Association:—I have much pleasure in welcoming you, each and all, to this our eighth annual meeting. Albeit not a denizen of this great city, I may be permitted to give you welcome, thrice welcome, to this metropolis of the Northwest, the marvellous product of the energy, the industry, the perseverence, and the thrift of the children of many nations who have made their homes upon her fertile lands, beneath her genial skies, and under the protection of her free institutions.

It is a time of intense political excitement; the air is rent by the cries of contending parties; but with us, while here, there is no north, no south, no east, no west. We come from every section of our beloved country, and some of our members come from the dominion of a Sovereign whose long and benignant reign has been a blessing to her subjects and an honor to her sex. Yet here we meet as brethren. Whatever may be our personal opinions upon questions of governmental policy, all contention in regard to them is hushed, and while here we shall devote ourselves to the consideration of matters relating to our daily duties as representatives and managers of an important and widely extended industry, and to those social enjoyments which soften, brighten, and elevate our lives. For one, I am glad, and I think we shall all be glad, to escape the din and the excitement of a political contest for even the brief time devoted to this convocation. We shall, I trust, find it restful and refreshing to give these three days before us to the consideration and discussion of themes connected with our special calling; and when they shall have passed away, I hope we may go to our respective homes feeling that it has been good to have been here.

The year that has passed since our last annual meeting has not, so far as I am aware, been distinguished by any remarkable changes in the condition of the gas lighting industry in either our own country or in foreign lands. There has been, however, a steady decline in the price of gas—in some instances a large decline—and an equally steady advance in measures demanded to meet the new conditions.

In regard to the first point, I have been for some time a believer in the doctrine that our companies should make their money, as all large manufacturing industries in the long run, make theirs—by large sales at a small per cent. of profit. Gas is a comfort, a luxury, which we should aim to bring as nearly as possible within the reach of all. In this matter our interest runs in the same direction with an enlightened public spirit. Our

only real competitor is petroleum, and that, at the low price prevailing for the last few years, and, by the use of improved lamps, is a *real* competitor. Yet in our larger towns, where a liberal consumption may be secured, if the gas works are in the best condition, if labor be judiciously applied, if good material be used, if the expense of distributing be kept at a low point, and if stockholders are satisfied with moderate dividends upon genuine unwatered stock, gas may be sold at a price which will make the margin of cost between good gas light and poor oil light very narrow.

With your leave, I will indicate some lines in which a steady advance in the right direction has been made during the last year.

1st.—The Best Furnaces for Heating Retorts.

It is obvious that managers of gas works must, ere long, adopt improved furnaces. The old furnaces, in which 40 to 50 per cent. of the coke produced is consumed in carbonizing, must be discarded, and some form of the many now claiming attention must take their place. If there be a furnace, as I am confident there is, which will require not more than 25 per cent., perhaps not more than 15 per cent., of the coke made—which will require much less labor in firing and clinkering, before which the laborer can work in comparative comfort, and above all, which will much more effectually heat the bench, making every retort equally useful from end to end—that furnace must be adopted. I do not undertake to indicate which is the better; indeed, I do not know; but that which is best must be searched out and must be introduced, and the discussions of the past year have helped a good deal in this direction.

2d.—The Best Scrubber.

One reason why gas can be sold so very low in the old world, especially in the British Isles, is the fact that the saving and utilizing of residual products have been there carried to a high degree of perfection. One of those residual products is ammonia. In this country that product has been, and is now, largely wasted. But it is a valuable product. In order to secure a successful working of the ammoniacal liquor produced in your works, you must have such scrubbing apparatus that you can take from your gas as it passes nearly all its ammonia, and save it in a concentrated form. Some scrubbers do this, and some do not. The truth as to the best scrubber has been slowly evolving for some years, and this matter has made considerable progress during the last year.

3d.—The Best System of Carbonizing.

I think I am correct in saying that fifteen years ago most gas managers were content with a product of from 4.26 to 4.50 cubic feet per pound of coal carbonized, and as a matter of fact the former figure was more generally the limit than the latter. Now our average of 5 feet is not considered extraordinary, and a few obtain a much larger product than that.

I have lately visited a works in which I was assured that more than an average of 6 was obtained, and I was credulous enough to believe the statement. However that may be, it is well settled that 5 feet and more may be made from every pound of good coal carbonized in your works. Time, quantity, heats, and enricher—all these items must be considered and adjusted in determining the best process for obtaining the largest yield of good gas. Poor quality will not be tolerated.

The past year has contributed something toward a solution of the question: What is the best system of carbonizing?

4th.—The Application of Machinery to the Charging and Discharging of Retorts.

One year ago I ventured to call your attention to machinery invented by Mr. Ross, and in use in the works of the Cincinnati Gas Light and Coke Company, and I beg leave to again call your attention to that machinery. I have a good deal of confidence in it, and I understand that much abler men than I am have endorsed it, and that it is likely to have a thorough trial in one of the largest works in America. I only ask you to examine it for yourselves. If that machinery is a success, the inventor has conferred a great benefit upon the gas fraternity.

5th.—Improved Burners and Improved Lanterns.

Perhaps no article of domestic comfort is more injudiciously and more wastefully used than that which you furnish, and no department of effort deserves more attention than this—the introduction of the best burners, and in our streets the best lanterns.

You may visit the house of one neighbor, and you will find the most perfect illumination; and you will find in the dwelling of another cheerless, half-lighted rooms, and yet perhaps the latter is consuming more gas than the former. The difference may be wholly caused by the burners employed. During the past few years, and especially the one just passed, much has been written and much has been done to remedy this difficulty. And this remark will apply to street lanterns. Some are adapted to their work and many are not. Too often the selection of the proper lantern is left to some chairman or some committee stupidly ignorant or indifferent. Sometimes the coaxing blandishments or the insinuating bribe of some scheming manufacturer of a "new and improved lantern" wins the day, and the wayfaring pedestrian curses good gas and denounces it as poor, when the whole difficulty lies in the burner used for its combustion, or the instrument used for its protection and diffusion, or both.

6th.—Day Consumption,

Probably greater advance has been made during the last year in promoting the use of gas in the kitchen, the laundry, and the engine room, than in any preceding year. I think this must be certainly true in our own country. In towns where gas is sold at a low rate a great many cooking and laundry stoves have been placed, and usually with much satisfaction to the parties using them. This good work will go forward.

So also the introduction of gas engines for many purposes is making rapid progress, and will progress more rapidly in the future.

The importance of promoting these various forms of day consumption is obvious to every gas man, and I need not dilate upon it here.

Thus, gentlemen, I have hurriedly referred to the march of improvement in your department of labor, as it appears from my standpoint. There might be much said upon many points of interest, as, for example, water gas, electric lighting, etc.; but these introductory remarks have already been extended quite far enough—perhaps too far, for I am sensible that I have said nothing new. It is now for you, gentlemen, to make this convocation eminently profitable and interesting.

The President—The next thing in order is the report of the Executive Committee in regard to the management of the Association during the past year.

Mr. H. Cartwright—I beg to refer to the report of the Executive Committtee in the hands of the Secretary, who will be kind enough to read it.

EXECUTIVE COMMITTEE'S REPORT.

The Secretary then read the report of the Executive Committee as follows:

CHICAGO, Oct. 13, 1880.

The Executive Committee of the American Gas Light Association respectfully report that they have examined and approve of the following papers offered for their examination, as per Article XXV. of the Constitution:

"Stoppage of Ascension Pipes," by Theobald Forstall, of New Orleans, Louisiana.

"Steam Stoking Inventions," by A. Hickenlooper, of Cincinnati, O.

"Gas Engines," by George G. Ramsdell, of Vincennes, Ind.

"Illuminating Power as a Basis for Compensation," by H. H. Edgerton, of Stamford, Conn.

"Lowe Process of Gas Manufacture," by W. H. Pearson, of Toronto, Canada.

"Coal Tar Products and Ammoniacal Liquor," by G. S. Page, of New York, N. Y.

"Gas Furnaces," by Adam Weber, of New York, N. Y.

"Consumers and Test Burners," by E. G. Love, of New York, N. Y.

"Heating by Gas," by W. W. Goodwin, of Philadelphia, Pa.

Ten members being three or more years in arrears, and having been duly notified thereof, we recommend that they be dropped from the roll of members. The proposed amendment to Article XVII. of the Constitution, changing the annual meeting from the third Wednesday in October to the third Wednesday in May, having laid upon the table for the required year, we recommend that it be considered by the Association.

We recommend that the Secretary be directed to proceed to the publication of Volume IV. of the Proceedings of the Association, including therein the Seventh and Eighth Annual Meetings.

We recommend that a committee be appointed to prepare a table of standards for the use of this Association, to the end that all papers presented here and discussions had on such papers may be based upon a common standard of results and comparisons.

We recommend that the salary of the Secretary and Treasurer be fixed at $300, with an allowance, not exceeding $100, for expenses during attendance at meetings.

We give notice that an amendment to Article IV. of the Constitution has been proposed, so that that Article will have added thereto the words "and industries relating thereto."

Respectfully submitted,

HENRY CARTWRIGHT,
A. C. WOOD,
JAMES M. STARR,
P. T. BURTIS,
GEO. S. HOOKEY.
Executive Committee.

WM. HENRY WHITE, *Secretary.*

The Secretary—I would respectfully state that in regard to the recommendations of the Committee in reference to those members who have not paid their dues, that they have pesistently refused to take notice of the

circulars sent them upon the subject. It is not necessary that those names should be mentioned. The Committee simply recommend the dropping of the names from the roll. I will also say that Professor Love, who has been experimenting upon and investigating the subject of test burners, etc., was asked to report at this meeting. That gentleman is here with us, but came so unexpectedly that he has not prepared a paper, but he will, doubtless, during the meeting, give us verbally the results of any experiments that he has made, and the Committee recommend extending the courtesy of the floor to him for any remarks that he may feel disposed to make. If there are any persons present who have papers, they will please notify the Secretary at once, as such papers cannot be read until they have been submitted to the Executive Committee.

The Executive Committee also calls attention to the fact that an amendment was reported at the last annual meeting, providing for amending Article XVII. of the Constitution, relating to the day of meeting, by substituting for the third Wednesday of October, the present date for the annual meeting, the Third Wednesday of May, at such place as may be determined upon. The necessary provision for this amendment having been made, it is now open for discussion, adoption, or rejection.

They also recommend that the salary of the Secretary be $300, the same as during the past year, with an allowance for traveling expenses. The Association having changed its permanent place of meeting from New York City, the traveling expenses of the Secretary are thus provided for to the extent of $100.

They also recommend that a committee be appointed by the Association, who shall report upon the adoption of standards of comparison of results. That is, that the exact dimensions of a bushel shall be determined, and also what a ton consists of, so that when a man speaks of a bushel, or when he speaks of a ton, we shall know exactly what he means. We have no such standard at present, and when we compare results this difficulty always presents itself. I move you, sir, that this report of the Committee be accepted and the recommendations taken up *seriatim*.

Carried.

The President—The next business in order is the report of the Treasurer.

TREASURER'S REPORT.

The Treasurer then submitted the following report:

NEW YORK, Sept. 30, 1880.

Receipts.

To cash balance, Oct. 1, 1879	$1,097 85	
Initiation fees	240 00	
Dues for year	640 00	
Back dues	163 00	
Dues for 1881 paid in advance	15 00	
Twelve volumes of Proceedings, at $1.25	15 00	
Two volumes of Proceedings, at $1.50	3 00	
Interest on deposits, July 1, 1880	22 50	
		$2,196 35

Disbursements.

By cash, publication of Vol. III. of Proceedings	$676 75	
Salary of Secretary and Treasurer	300 00	
Postage	56 61	
Printing and stationery	27 35	
Sundries	22 10	
Balance in banks	1,112 50	
Balance on hand	1 04	
		$2,196 35

It was moved and seconded that the report of the Treasurer be referred to the Finance Committee for their approval.

Carried.

Mr. Forstall—In the absence of the Chairman of the Finance Committee, I beg to report that the members of that Committee who are present have examined the report of the Treasurer and his vouchers, and have found them correct.

The Treasurer—Mr. Chambers was unable to come, but he examined the accounts in New York and found them correct, and certified to them.

The President—Have you, Mr. Forstall, certified upon this report the results of your examination?

Mr. Forstall—Yes, sir; the members here have all signed it.

The President—The next thing in order is the report of the Finance Committee.

Mr. Forstall—The report was a verbal one, and I have already submitted it.

The President—The next business in order is the reports of Special Committees.

The Secretary—There is a report due the Association upon the subject of standard test burners, from a committee consisting of Mr. C. Nettleton, Major Dresser, and Mr. Sherman. Major Dresser is the only member of that Committee present. There is also a report due from the Committee on Unaccounted-for Gas, which was continued over from the last annual meeting. These are the only special committees. The members of the latter committee are Mr. A. C. Wood, of Syracuse, and Mr. C. A. White. I believe there were only two members appointed.

The President—Are those committees prepared to report?

Major Dresser—As the only member of the Committee on Burners present, I would state that we desire simply to report progress. We have had several consultations upon this matter, and a series of experiments was undertaken for determining the questions that have been submitted to us; and as the Committee were about going on with then, we received the most able report of a committee of the British Association for the Advancement of Science, a part of which was published last year drawn up by Dr. Wallace, and a part this year by Mr. John Pattinson, F.C.S., F.J C. We found this report was so able and complete, bearing upon this subject and upon all the different burners that were presented in the market, that we felt it was not fair for us, as a committee of this Association, to submit a complete report to this meeting, as we had not prepared anything like the information we desire to give. But, with the information embodied in these papers, your committee will be able to go more fully and completely into the matter; and we hope in another year to submit a report that will be satisfactory. We would therefore simply report progress, and ask that the committee be continued.

The President—You have heard Major Dresser's report; is it your pleasure that this committee be continued for another year, and requested to complete their report?

On motion, the Committee was continued for another year.

The President—Mr. A. C. Wood, a member of the Committee on Unaccounted-for Gas, is present, and we would like to hear this report.

Mr. Wood—I think that Mr. C. A. White, of Rochester, was chosen as the Chairman of that Committee, but he is not present. I will simply state that this Committee is not ready to report. As for myself, I must acknowledge that I have not the skill and ability to establish a uniform rule for unaccounted-for gas. The conditions change with every company. Mr. White claimed that he had discovered a solution of this problem, and I have left the matter wholly in his hands, and I supposed he would be here to present his solution. I think that perhaps Mr. White may have failed in reaching the conclusions which he expected would solve the problem, and I do not think there is any necessity for a continuance of this Committee. I think the the matter of unaccounted-for gas is one that must be left to each engineer and superintendent of gas works to deal with as best he may. I believe it is utterly impossible to establish a uniform rule to govern that question, and I would therefore ask that the Committee be discharged.

The President—It is possible that Mr. White may be present before the meeting closes.

The Secretary—I received a letter from Mr. White, stating his utter inability to be present. He made no reference to a report, however, although I notified the members of these special committees some two or three months ago that reports were due from them at this meeting.

Mr. Wood—If there is any desire to continue the matter in the hands of Mr. White, I will withdraw the request I made.

The President—I hope the Association will not drop the question. It might therefore be advisable to reconstruct the Committee, including Mr. Wood, of course, and request a report at the next annual meeting. What is your pleasure in regard to that?

Mr. Cabot—I move that the matter stand as it is for another year. At the expiration of that time if it is necessary to dissolve the Committee we can do so.

The President—It is moved that the consideration of this question be postponed until the next annual meeting, and that the present Committee be continued until that time. (Carried.) Do you, Mr. Wood, wish anybody else associated with you?

Mr. Wood—I do not think there will be any necessity for that. I think Mr. White will cover the whole subject.

Mr. Parkhurst—I rise to get information on a question of privilege. I represent the Coldwater Gas Light Company as its president. I find that my name is not upon the roll, and I feel somewhat in doubt as to whether I am a member or not. Some three years ago I notified the Secretary of the fact that Mr. Wilder, who had represented our company, was no longer in our employ, and was no longer engaged in the business, and asked that the transfer of membership be made from Mr. Wilder, who was the superintendent, to the president of the company.

The President—The Secretary can probably explain that.

The Secretary—If the gentleman will yield a moment, I will explain the matter, I think, to his satisfaction and the satisfaction of the Association. The Secretary last year ordered so many copies of the Constitution containing the list of members that it seemed a waste to throw them away, so I have

made use of them. These copies do not contain your name, because when they were printed you were not a member. Your name, however, appears upon the books of the Association as a member, and when the list is reprinted it will appeer there.

Mr. Parkhurst—That explanation is entirely satisfactory.

The President—It is now proper to proceed to the election of officers. Our custom has been to appoint a committee to make a report of suitable names for officers for the ensuing year. After that report is made, it is taken up and disposed of either by adoption, amendment, or rejection.

The Secretary—There is an amendment to our Constitution bearing directly upon this subject, and it would be well to call attention to it, so that the Committee will be possessed of the latest information. It is that "a change of at least one Vice-President, one member of the Finance Committee, and two members of the Executive Committee, shall be made at each annual meeting of the Association," and the Committee on the Nomination of Officers will have to bear that in mind. That is the amendment to section 11, on the last page of the book.

The President—I will say that in the present instance the President will not be eligible for re-election. I will name the following gentlemen as a committee to report suitable names for officers of the Association for the ensuing year: Henry Cartwright, O. E. Cushing, Thomas Turner, Gideon Wood, and W. H. Miller. It is suggested that these gentlemen meet between this time and the assembling of the Association this afternoon, and be prepared to make their report at that time.

We have now arrived at the time when the reading of papers is in order, of which notice has been given. Mr. Forstall's paper has been placed first upon the list by the committee. It has been suggested that before listening to the paper of Mr. Forstall we dispose of the recommendations of the Executive Committee. The Secretary will please read them.

The Secretary—The first recommendation is the adoption of the amendment to Article XVII., changing that Article so as to strike out the word "October" and insert the work "May," thus making it read: "The annual meeting will be held on the third Wednesday of May." I move the adoption of that recommendation.

The President—Let us have a fair interchange of opinion upon this question, and not dispose of it too hurriedly and inconsiderately. If there are any members who would be greatly inconvenienced by the change, I hope they will not hesitate to express their opinions. I would be very glad to hear from the members upon this proposition.

Mr. Denniston—This Association now meets but once a year. When it met twice a year it met in May and October. Now the object is to meet at a time that will suit members better than October. I, therefore, move an amendment to the report of the committee fixing the time in September. At that time the members of the gas fraternity have not reached the busy season that they have in October, and it will suit many members better than May, and that will not conflict with the Western Association, which, as I understand, meets in May, and those who desire to attend both meetings cannot do so very well in the same month. I, therefore, move to strike out May and insert September. I would say that, so far as I am personally concerned, one month would suit me as well as another. The members from the East make up their accounts in the month of October, and I think it would be very inconvenient for them to meet just at that time when everything is pressing in regard to their accounts.

Mr. Hickenlooper—It would seem to me proper that the Association should meet at a date earlier rather than later than the one named by the committee, for the reason that the summer season is the one when we make changes for the winter's work; and if there is any benefit to be derived from our attendance upon the meetings of this Association it should be acquired just previous to the time when we are making changes and improvements. I, therefore, think that April would be a better month than either of the others named.

The President—The amendment proposed by Mr. Denniston, substituting September for May, is in order.

Mr. Forstall—I believe I was the one who suggested the change. My object in selecting the month of May was that in October we are generally all busy. There are many members who cannot leave their works at that time. My purpose was to select some month when it would be the most convenient or us to attend. The amendment suggested by General Hickenlooper would meet my views perfectly. Or the amendment recommended by the Executive Committee may be changed so as to make it the first Wednesday in May instead of the third Wednesday. That would avoid conflict with the Western Association, and allow us to compare notes before making changes during the summer for the next season's business. Our object in coming here is to compare notes and decide when we get home, whether we shall make certain alterations and improvements in our works. I think it is better that the meeting should be held before rather than after we have decided upon our next winter's work. I, therefore, suggest the first Monday in May instead of the third Wednesday, as recommended by the Committee.

Mr. Hickenlooper—I suggested April for the reason that if the date recommended by the Committee should be changed, we might fix upon an earlier date than the one recommended by them. While I am not opposed to the recommendations of the committee, I think if we are to alter the date, we should fix upon an earlier rather than a later one.

The President—The members of the Association will bear in mind that in some of the northern sections of the country the spring opens very late. Sometimes the snow is not gone in April. It would be well to consider all these matters. I feel, personally, very desirous that the question should be very carefully settled and settled so as to stay settled.

Mr. Denniston—The reason why I made a motion to amend was not so much on my own account as for the reason that, having had some talk with members of the Western Association, I found that they were very much opposed to meeting in May. They did not want to meet in May as recommended by your committee, for the reason that their Association meets in May, as I stated before. I recognize the soundness of the logic of Mr. Hickenlooper and Mr. Forstall in having the time fixed at an earlier day than that named by the Committee for the reason that any changes that are suggested here could be acted upon in case it was deemed desirable. I, therefore, do not myself object to April, but it brings the meetings of the two Associations almost together—one in April and the other in May—and it might be difficult for the superintendents or the engineers of gas companies to be absent two months in succession, and spend two weeks away from their work. Personally, it makes very little difference to me whether the time be September or April. Whatever suits the majority of the members will be perfectly satisfactory to me. I am only anxious that we should fix upon a time that will be of the greatest service and convenience to the greatest number; and I presume the Western Association will readily accede to what the majority of the Association shall decide upon. To test the sense of the Association, therefore, I would suggest that we take a vote upon the amendments proposed.

Mr. Wood, of Syracuse—The members of the Association will remember that the proposed amendment did not originate with the Executive Committee at the present meeting, but is in accordance with a resolution which was passed a year ago providing for an amendment to that effect.

The President—A resolution of that kind was submitted to the Association a year ago and was laid over.

Mr. Wood—Yes; and the Executive Committee now recommend the adoption of that amendment to the Constitution. The time was fixed by the resolution submitted one year ago, whereas Mr. Denniston's objections to the month of May, on account of the meetings of the Western and Central New York Associations, have just been raised. If we should change the time of our meeting so as to conflict with theirs, we being the larger number, they would conform the time for their meeting to the time fixed by us for ours. I think the meeting of this Association should be fixed for a time when the greatest number could be present.

Mr. Spencer—I suppose that the question now before the Association is the adoption or rejection of the amendment to the Constitution proposed by the Executive Committee.

The President—The amendment proposed by Mr. Denniston is now before us.

Mr. Spencer—Do I understand that a proposition to amend the Constitution must be presented at one meeting and acted upon at the next?

The President—Yes, sir.

Mr. Spencer—Can such a proposition or resolution be amended? Must we not vote directly upon the amendment proposed or recommended? It occurs to me that the question is narrowed to the adoption or rejection of the proposition as submitted by the Executive Committee. If so, I shall certainly vote against the adoption of the amendment for the reasons that have been named in regard to the meeting of the Western Association. That Association has been organized and the time of its meeting appointed with special reference to the date fixed for the meeting of this Association. I am a member of that Association, and also a member of this, though I have not attended many of its meetings. Knowing that the time of the meeting of the Western Association was fixed with special reference to the meeting of this Association, I should very much regret to see this Association fix the time of its annual meeting so near the time of the meeting of the Western Association. Again, in regard to the reasons assigned by Gen. Hickenlooper and Mr. Forstall for making the change, namely, that the gas companies may have an opportunity of availing themselves of any advantages to be derived from the meeting of this Association, it has occurred to me that any suggestions that may be made here, anything we may learn here, will keep very well until the following season. If we have the meeting in October, as at present, and papers are presented and discussed which contain anything that we think would be valuable in our business, I think it would be well for us to consider them during the winter. We might, at the end of that time, arrive at a different conclusion. Or we might be able, after thinking the matter over carefully, to suggest some improvement. At

any rate, I do not think there could be any harm in letting such suggestions lie over for a year, and a great deal of good might result from such a course. I am in favor, if we cannot amend this proposition as suggested by Mr. Denniston, of keeping the matter where it is, and rejecting the amendment proposed by the Executive Committee.

Mr. Littlehales—Is not the first question to be decided the question whether Ms. Denniston's amendment can now be entertained, or whether it will not have to lie over for another year? It seems to me that that question must first be passed upon before the Association can express its wish in regard to the matter.

The President—That is a point I have given no special thought to, but my impression is that any amendment germane to the main proposition could be properly entertained, and that any proposition simply to vary the date from one month to another is legitimate. That is the view I am inclined to take of it.

Mr. Starr—I heartily agree with Gen. Hickenlooper in regard to the time of meeting if any change is made. If the time is fixed early in the spring, it will not conflict with the Western Association. September would be a disagreeable month on account of the heat, but October is a pleasant month, and so is May; but I think April would be better than May, for then there would be an interval of two or three weeks between our meeting and the meeting of the Western Association. For these reasons I prefer April.

The President—I think it might be well to let this matter lie over until to-morrow. In the meantime the members of the Association can discuss it among themselves.

Mr. Cartwright (Philadelphia)—I move that the question be laid on the table until to-morrow afternoon, and that it then be the first thing in order.

Carried.

The Secretary—The next question is upon the adoption of the recommendation of the Executive Committee that the salary of the Secretary be $300 per annum, with an allowance for expenses in attending the meetings not to exceed $100 on any one occasion, and I move its adoption.

Major Dresser—I do not think the recommendation for an allowance of $100 to the Secretary for traveling expenses to and from the annual meetings needs discussion. It seems to me that the justice of it is apparent. The salary of $300, the same as it has previously been, is very small.

The question was put and carried unanimously.

The Secretary—The next recommendation of the Executive Committee is the appointment of a committee of three upon standards for comparison of results, to report at this meeting. I move its adoption, and that the committee be appointed by the Chair.

Carried.

The President—I will announce the names of the gentlemen to compose the committee this afternoon. That disposes of the business now before us in regard to the recommendations of the Executive Committee.

Mr. Denniston—As the Committee have not suggested any hour for meeting, would it not be well to fix the hour for the meeting of the Association?

The Secretary—The hour for our meeting in the morning is fixed at 10 o'clock. It has been the custom hitherto to adjourn for lunch, and to fix the hour after that as suits our convenience. It might be well for a motion to be made to adjourn for lunch.

The President—It is not worth while to hurry the proceedings. It is scarcely worth while to take up any paper previous to the adjournment, and there is nothing else now before us. I think that an hour spent in social intercourse and the shaking of hands would be very pleasant as well as profitable. It might be well, therefore, to adjourn now, and take up Mr. Forstall's paper immediately upon reassembling this afternoon.

On motion of Mr. Cabot the Association then adjourned until 2 P.M.

Afternoon Session—Oct. 13.

The Association met at 2 P.M., pursuant to adjournment, and was called to order by the President.

The President—We can proceed with a part of our regular business before Mr. Forstall commences to read his paper. The next thing in order will be the report of the Committee on Nomination of Officers for the ensuing year.

Mr. Cartwright (Philadelphia)—The Committee on the Nomination of Officers beg leave to report the following for election for the coming year:

For President—W. H. Price, Cleveland, Ohio.

For Vice-Presidents—A. Hickenlooper, Cincinnati, Ohio; Theobald Forstall, New Orleans, La.; Wm. A. Stedman, Newport, R. I.

Secretary and Treasurer—Wm. Henry White, New York City.

Finance Committee—John S. Chambers, Trenton, N. J.; A. B. Slater, Providence, R. I.; George S. Hookey, Augusta, Ga.

Executive Committee—Henry Cartwright, Phila., Pa.; F. C. Sherman, New Haven, Conn.; A. C. Wood, Syracuse, N. Y.; P. T. Burtis, Chicago, Ill.; T. Littlehales, Hamilton, Ont.; Samuel Prichitt, Nashville, Tenn.

The Secretary—I move that the report of the Committee on the Nomination of Officers be accepted and the Committee discharged with thanks.

The President—I wish to say, as my name stands at the head of the list of officers as submitted by the Committee, that, at the very outset, I did not think it would be there, and I did not think it ought to be there. I have been so many times in the Chair that I think it would be eminently proper that some one else should take this place. That is my personal feeling in regard to the matter now.

Mr. Denniston—It is in order now for the Association to proceed to the election of officers, and I move that the Secretary be instructed to cast a ballot in behalf of the Association for the gentlemen named by the Committee.

Carried.

The Chair appointed Major Dresser teller. The Secretary then cast the ballot of the Association for the candidates named, and they were declared by Major Dresser to be unanimously elected. (Applause.)

The President—So far as I am personally concerned, I thank you most sincerely, gentlemen of the Association, for the confidence in me that your action implies. Still, I feel precisely as I did before, that it would have been well to have made a change; but I submit to your decision. (Applause.)

I promised to appoint a Committee on Standard Weights and Measures immediately upon our reassembling. I appoint Mr. Theobald Forstall, of New Orleans, La.; Mr. George Hookey, of Augusta, Ga.; Mr. A. B. Slater, of Providence, R. I.

The Secretary—Before Mr. Forstall begins the reading of his paper, I would state that the Executive Committee have, since the adjournment, received a communication from Mr. C. C. Anderson, superintendent of the Marquette, Michigan, Gas Works, in which he says—

"I send sample of aniline taken from coal tar. Not knowing its value, would be pleased to bring the matter before your body for its consideration."

I would state that the sample to which he refers has been received, and I would respectfully suggest that that sample be put in charge of Mr. Page, whose experience in such matters will enable him to give Mr. Anderson any information that will be of service to him.

Mr. Helme—I think it has been the custom in the past to invite the members of kindred societies, who happen to be in the city at the time of our meeting, to seats with us. If that has been omitted, I move that such invitation be extended now.

The President—I think it will be understood that members of any kindred association are invited to take seats in this room with us. If there are any members of such associations present, they will consider themselves invited to take seats with the members.

Mr. Forstall then read a paper

on stoppages in ascension pipes.

I must apologize at the outset for taking up your time with a subject upon which so much has already been written that it would seem exhausted; but "out of the fulness of the heart the mouth speaketh," and when called upon by our Secretary for a paper I could think of nothing more interesting for discussion than the cause and prevention of an evil from which we have suffered much in New Orleans, and against which the remedies most effective elsewhere have failed in our works. Moreover, while studying what has hitherto been published on this subject, I found the various contributions so scattered in time and place that I thought it might prove useful to gather together in one paper the notes collected from English and French sources.

I shall first, then, review as concisely as possible the various opinions which have been offered as to the cause and prevention of stoppages in ascension pipes; secondly, describe our New Orleans experience, and, lastly, submit for discussion a theory of stoppages, suggested by that experience, in opposition to that generally entertained.

1.—*What has been Published about Stoppages.*

The proceedings of the British Gas Managers Association contain several contributions devoted to our present subject. The first in time, as well as in value, is a paper read at the Dublin meeting, in June, 1871, by Mr. John Somerville, of Dublin. He therein attributes the stoppage of ascension pipes to the general accumulation of "the carbonaceous part of the condensation," which adheres to the surface of the pipes, when these have been overheated (1) by the higher temperature of the gas produced towards the end of the charge; (2) by transmission from the mouthpiece; and (3) by radiation from the brickwork of the bench. He refers to the various expedients adopted without much success to overcome or prevent them, viz.: wet coal, vessels of water, rock salt, soda, etc., placed in the mouthpiece, after charging, and iron shields interposed between the front wall of benches and the ascension pipes. He recommends, as conditions to prevent stop-

pages, (1) that the front wall of benches be not less than one and one-half bricks in thickness; (2) that mouthpieces be made not less than 15 inches deep, with a clear space of six inches between stand pipes and wall; (3) that the pipes be cast thin, not less than six inches in diameter; (4) that the hydraulic main be raised three feet above the top of the brickwork; and (5) that sheet-iron shields, four or five feet high, resting on each mouthpiece at an angle of 35°, be fitted to the bench to deflect from the pipes the flames which play about them at the time of drawing and charging. Finally, he adds: "Doubtless, if ascension pipes were cast double, or having a jacket surrounding them, with a constant circulation of water or air from top to bottom, stopped pipes would be unknown; and also, if a piece of non-conducting material, a foot in length, attached to the mouthpiece and the ascension pipe leading from it, could be introduced at moderate expense, it would tend greatly to diminish the transmission of heat from one to the other."

Mr. Somerville, therefore, believed that stoppages were occasioned by excessive heat of the pipes, and that the cure lay in cooling them. How this object was to be assisted by enveloping the mouthpiece and lower portion of the stand pipe in non-conducting material is not clear. We shall see, as we proceed, that the assumption that the temperature of the gas in the ascension pipes is highest at the end of the charge, is disproved by the thermometer. The reverse is true.

At the Edinburgh meeting, in June, 1873, two papers were read upon this subject. Mr. Green, of Dartford, reasons upon the idea that stoppages are due to "particles of disintegrated carbon and other dry substances," which are made under very high heats, and are swept off and mingle with, and are carried along by the crude gas into the ascension pipes, where meeting the tar that slowly flows down the sides of the ascension pipe, it becomes thickened with this continuous process. The remedy which he proposes is a guard of woven wire with shelves, placed in the mouthpiece after charging. The gas issues through the close meshes of wire, and deposits on the shelves the solid particles of carbon.

Mr. Parlby, of Aylesburg, in his paper, gives four reasons for stopped pipes: (1) the heat of the coke at the end of the charge; (2) a large dip pipe seal; (3) flaws or defects in pipe castings; and (4) insufficient size of hydraulic main. His remedies are: "an uniform temperature in the retorts, say, a good white heat," "mouthpieces kept clear of carbonaceous or tarry matter," and "heavy charges in the hottest retorts."

The subject came up before the British Managers again in 1874, when Mr. Hodgson Jones, of London, described and recommended Vincent's Patent Gratings, which appear to be merely a modification of Green's wire screens.

Our Scottish brethren now follow in order. Mr. Malam, of Dumfries, describes, at the Glasgow Meeting of the North British Gas Managers, in June, 1874, an adaptation and extension of Mr. Somerville's suggestion for cooling the ascension pipes with water. The chief cause of stoppages in the ascension and other pipes, he says, is "as we all well know, the adhesion to the inside of the pipes of the highly decomposed hydrocarbons which are carried forward by the gas." His patented preventive is "a trough formed on the mouthpiece, embracing the lower end of the ascension pipe, which is kept constantly filled with water supplied by a circle of jets at the top of the ascension pipe flowing down the outside. Additional assistance is afforded by a continuous spray of water down the interior of the ascension pipe and through the mouthpiece."

The West of Scotland Gas Managers heard a paper from Mr. Martin, of Kilmakolm. He tersely says: "I am of opinion that it is the tar in the hydraulic main which is the actual and immediate cause of choked ascension pipes;" and his preventive consists in running out the tar from the bottom of the hydraulic main, after every charge, allowing the dips to be sealed with ammoniacal liquor only.

Crossing the Channel we find the French gas engineers taking up this question where the English have left it.

M. Rouget, of Brest, gives his experience in an interesting communication at the meeting in May, 1876. The stoppages in his works occurred in the longest as well as in the shortest ascension pipes, wherever the retorts are hottest. He attributes them to the distillation of the tar flowing down the sides of the pipes, by the heat of the issuing gas, thus forming successive layers of pitch. He found relief, but not immunity, by surrounding several ascension pipes with non-conducting material. The effect was to prevent internal cooling and thus to alter the characteristics of the adherent obstruction. Instead of tough, viscous pitch, the pipes were now filled with a dry, granular substance, easily removed. This relief was apparent only, however, as the bridge and dip pipes soon distilled the tar, and in their turn became stopped with tough pitch. An attempt was then made to cool the bridge and dip pipes by jets of water, but this was found to be difficult and ineffective and was given up.

At the same meeting, M. Brémond, of Versailles, whose name has since become familiar to us in connection with his paper on "Naphthaline," gave further valuable testimony from his experience as to the effect upon stoppages of confining the heat in the ascension pipes. In the Vaugirard station of the Paris Gas Company, M. Letreust, the engineer, had applied to a number of benches an "anti-refrigerating" treatment, of his invention. All the mouthpieces, and the ascension pipes as far up as the brickwork extended, were built into and covered by the front wall of the benches, and the mouthpieces were fitted with double doors to prevent radiation. Stopped pipes were frequent; but the stoppages occurred mostly just at the point where the ascension pipes emerged from their hot bed. By extending the non-conducting coat as far as the dip pipes the stoppages were transferred to the inside of the hydraulic main. M. Brémond concurs in the opinion of Mr. Somerville, which he quotes, regarding the prevention of stoppages by the use of double or jacketed ascension pipes cooled by currents of air or water, and concludes as follows:

"It is my opinion that to overcome the obstruction of stand, bridge, and dip pipes, we should suddenly cool the gas as it issues from the retort, facilitate its flow by pipes of large section, remove the seal from the dip pipes during the distillation of the charge, and, lastly, cool energetically the hydraulic main, in which the liquids should be changed as frequently as possible."

At the Paris meeting in June, 1878, M. Rouget presented a supplementary communication, in which he claims to have at last found means to apply easily to the ascension pipes the principle of rapid cooling. He substitutes for the thin ascension pipe ordinarily adopted, a pipe two or three inches in thickness, the outer circumference of which is deeply dentated to increase the radiating surface. He asserts that by the use of these new pipes the temperature has been lowered internally 105° Cent. (221°F.) during the passage of the gas from the monthpiece through a distance of five feet six inches only; while in ordinary pipes, upon corresponding retorts, the loss of heat under similar circumstances was but 14° Cent. (58°F.) In the discussion on this paper one member asserted that he had prevented stoppages by the use of sheet iron ascension pipes, reaching thereby, more naturally, the same result. Mr. Gil, of Barcelona, contended, on the other hand, that the cooling of ascension pipes tends to produce stoppages. He himself had tried a jet of cold air blown through a tube against a series of ascension pipes and every pipe operated upon had been choked. Mr. Ellissen said that a steady flow of water through the hydraulic main was the most certain and simple preventive of stoppages.

Returning now to our own shores I find, in the American Gas Light Journal, Feb. 2d, 1880, a letter from Mr. Egner, of Norfolk, advising the use of a jet of steam in the stand pipe, and, finally, the interesting paper of Mr. W. A. Wood, of Syracuse, read before the Central New York Gas Engineers Association last February. This is, doubtless, familiar to all of us, and you will remember how graphically he describes the conversion of his retort house from a pandemonium into a quaker meeting house, by the saving grace of water immersion—I should say injections in his ascension pipes.

Alas! We, in New Orleans, added prayer to the water, but conversion did not follow.

2.—*Stoppages in the New Orleans Gas Works.*

The evil made its appearance in our works in 1871, with the use of high heats and large yield. Our retorts were small D's, 12 × 20 inches, in benches of five, carbonizing 1100 and 1150 pounds of Pittsburgh coal in four hours, and fitted with 4 inch stand, bridge and dip pipes. The hydraulic main was circular and small, only 16 inches in diameter. During the four years that we continued to run these settings, stoppages were occasional only, mostly in the stand dipes, rarely in the bridge, and not a single case recorded in a dip pipe. The tar in the hydraulic main remained fluid and flowed off easily. In 1875 the works were remodelled. Large retorts, 14 × 25 inches, in benches of six, were erected. The four hour charge was increased to 1600 and 1650, (266 lbs. and 275 lbs. per retort); the stand and bridge pipes were enlarged to 6 inches, but the dip pipes inside the hydraulic main were contracted to four inches. This contraction of the dip pipe, in the light of subsequent stoppages there, was possibly a mistake. Its object was to avoid unduly increasing the weight and dimensions of the hydraulic main.

The retort house is 245 feet long, with a clear width of 62 feet. To secure free ventilation during our tropical summers, the long sides of the building are not enclosed by walls, the roof being borne upon two lines of iron columns 26 feet in height. Forty-eight benches extend in line, twenty-four on each side, back to back, and fronting north and south respectively. The south benches are protected from driving storms and cold winds by rolling shutters fitted between the columns. The north benches are shielded by the coal shed, the roof of which is supported by the retort house columns on that side. The bench settings are all alike, and the manipulation is the same on both sides of the house.

From the beginning, the stoppages were more frequent on the new than on the old benches, and they have since increased from winter to winter, until we were compelled, last season, to detail two men day and night to the special work of clearing out the worst pipes. During a period of ninety days from December to March there were 1605 separate, distinct and com-

plete stoppages in the stand, bridge and dip pipes of twelve retorts. In spite of every remedy this state of things continued until May, when the stoppages, as usual, gradually ceased, for the summer, to return when cold weather sets in.

A daily record of every stoppage has been kept for more than two years, and many careful thermometrical observations of the temperature in the pipes have been made from time to time by Mr. Carroll the manager of the works. These records show that the stoppages occur almost exclusively in the pipes of the two upper retorts, and are many times more frequent on the north than on the south side benches; but while this latter condition was constant with regard to the aggregate number of benches under fire, it was found that certain pipes on the south side would be stopped as frequently as the worst on the north side; while, on the other hand, certain north side pipes remained as clear as the freest on the south side. The stoppages extend even into the hydraulic main, which is seldom free from thick, semi-solid pitch.

The following table shows the stoppages on twenty benches during December and January last. The odd numbers are north and the even numbers south side benches. Number 25 backs 26, No. 27 backs 28, and so on to the end of the range—

Table A.

North Side Benches.	1879–80 Dec. & Jan. Days in Action.	Number of Stopped Pipes. Stand.	Bridge.	Dips.	Total.
25	62	5	14	2	21
27	62	0	0	0	0
29	62	0	0	0	0
31	62	0	2	3	5
33	61	72	88	42	202
35	61	82	94	47	223
37	60	96	99	49	244
39	61	43	47	16	106
41	62	75	90	36	201
43	60	29	41	16	86
		402	475	211	1088
South Side Benches.					
26	61	4	12	3	19
28	61	0	2	0	2
30	61	0	0	0	0
32	61	0	0	0	0
34	60	5	7	3	15
36	60	4	5	3	12
38	59	1	3	1	5
40	61	11	13	0	24
42	61	30	34	10	74
44	58	39	45	18	102
		94	121	38	253

It will be here seen that 1088 stoppages occurred in 62 days on the ten north side benches; of these 402 were in the stand, 475 in the bridge, and 211 in the dip pipes. The ten adjoining south benches scored but 253 stoppages in the same time, less than one-fourth the number. The exceptional benches are Nos. 40, 42 and 44, with 24, 74 and 102 stoppages, respectively, on the favored side; while Nos. 27, 89 and 31 on the north side were as free as any of the south side benches. Thus, alongside of the general fact pointing to the influence of atmospheric changes from prevailing winds, arose perplexing, anomalous exceptions which complicate the problem. Again, periodical changes occur of weeks or months. Benches free from stoppages will suddenly fall into line with high scores for several weeks, and then as suddenly drop out again. Thus benches 27 and 29 were free throughout December January and February, but scored 69 and 59 stoppages, respectively, during March and April. On May 12, 1879, when every bench had been free for weeks, all the bridge and dip pipes of the upper retorts were stopped on the north side of the house, and, on the next day, all the corresponding pipes on the south side were similarly stopped. There were no stoppages for weeks afterwards. During all the time covered by these records, the coal used has been from the same mines, the heats have been fairly uniform, and the firing and charging done by the same men.

The next table exhibits the comparative number of stoppages in each of 12 benches during the time when they were actually under fire in the seasons of 1878, 1879, and 1880. The north and south adjacent benches are paired to make plainer the difference between them.

The general rule of south side exemption is here shown to be constant, as well as the fact that the south is not quite solid, as bench No. 44 scores 96 stoppages in 82 days.

Table B.—Stoppages in Twelve Benches, 1878 to 1880.

Benches.	1878. No. of Days in Action.	1878. No. of Stoppages.	1879. No. of Days in Action.	1879. No. of Stoppages.	1880. No. of Days in Action.	1880. No. of Stoppages.	Totals.
No. 27, North.	145	47	243	40	177	110	197
No. 28, South.	148	4	234	5	190	2	11
No. 29, North.	145	45	218	50	195	140	235
No. 30, South.	144	9	220	22	196	48	79
No. 31, North.	144	56	197	49	202	131	236
No. 32, South.	143	13	187	3	203	8	24
No. 33, North.	98	66	138	135	209	278	479
No. 34, South.	130	0	154	5	206	42	47
No. 35, North.	76	30	112	140	160	386	556
No. 36, South.	76	0	103	12	165	8	20
No. 43, North.	.....	.....	44	56	37	49	105
No. 44, South.	.....	.....	44	27	38	69	96

The observations taken of the temperature in the ascension pipes during progressive phases of the distillation furnished no clue to the cause of the immunity enjoyed by the lower retorts of every bench, and by all the retorts of some benches, while in their immediate neighbors the habit of stopping was most strongly developed. With equal charges and heats the temperature in all the ascension pipes of a given bench varies but slightly at the same distance from the mouthpiece, and at the same period of distillation. From a great number of tests, between which a remarkable conformity exists, the mean temperatures are here given. In the tables, No. 1 is always the lower, No. 2 the middle and Nos. 3 and 4 the upper retorts. In all the observations the bulb of the thermometer was exposed in the center of the pipe, and the tube carefully insulated from the metal.

Table C.—Mean Temperature in Ascension Pipes During Distillation.

Charge, 266 pounds; 4 hours. Bench No. 37.

Time of Observation after Charging.	5 M.	30 M.	1 H.	1½ H.	2 H.	2½ H.	3 H.	3½ H.	Mean of 3½ H.	Mean of 3 H.	Mean of 3½ H.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.			
At 7 feet 9 inches above mouthpiece—											
Retort No. 3	455	446	406	365	303	257	198	180	326.2	256.8	237.5
Retort No. 2	469	459	428	388	327	286	235	194	348.2	251.2	210.7
Retort No. 1	451	437	412	371	322	280	216	180	333.6	252.8	186.7
At 12 feet 10 inches above mouthpiece—											179.7
Retort No. 3	325	318	286	257	246	199	167	.....		.....	
Retort No. 2	318	302	284	266	226	196	167	.....		.....	
Retort No. 1	300	289	273	257	237	216	198	.....		.....	
At bridge pipes—											
12 feet 10 inches from mouthpiece of No. 3	320	306	291	268	232	198	158	127	330.0		
14 feet 10 inches from mouthpiece of No. 2	302	293	261	216	183	160	142	129	312.0		
16 feet 10 inches from mouthpiece of No. 1	268	252	219	190	165	145	133	122	296.6		
17 feet 10 inches from mouthpiece of No. 4	252	228	210	187	167	145	131	118			
At 7 feet 9 inches above mouthpiece—											
Retort No. 3, 331 pounds coal	414	392	374	320	316	309	275	239	288.3		
Retort No. 2, 254 pounds coal	406	385	379	358	309	275	221	181	370.6		
Retort No. 1, 254 pounds coal	390	383	383	334	275	244	198	165	350.6		
Retort No. 3, 201 pounds coal	433	421	347	284	261	221	185	164			
Retort No. 2, 279 pounds coal	468	448	428	381	378	325	277	261			
Retort No 1, 279 pounds coal	459	432	405	365	349	306	262	228			

Four facts may be noted in connection with these figures.

First, that the temperature is at the maximum just after the retort has been charged, and then constantly falls to the end of the distillation, reversing the conditions which exist in the retort itself.

Second, that from the moment the gas enters the ascension pipe the loss of heat is very rapid along its whole length.

Third, that towards the end of the distillation, the temperature in the bridge pipes is lower than that of the mixed gas in the hydraulic main.

Fourth, that an increase in the weight of the charge raises the mean temperature of the ascension pipes during the whole period of distillation.

The mean temperatures in the bridge pipes of four adjacent benches, of which two were north and two south, with normal charges, are given in the next table. Of these benches all but No. 36 were persistently obstructed, yet the temperature in No. 3 ascension pipe of that bench is higher than in the corresponding pipes of benches Nos. 43 and 44, and the initial temperatures at the bridge, only one degree lower than in the same pipe of Number 35.

Table D.—Temperature in Ascension Pipes During Distillation.

Charge, 266 pounds; 4 hours. At bridge pipes.	Time of Observation after Charging							Mean of 3½ H.
	5 M.	30 M.	1 H.	1½ H.	2 H.	2½ H.	3 H.	3½ H.	
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
Bench No. 35—									
Retort No. 3	337	326	313	295	268	236	206	185	277.4
Retort No. 2	293	273	259	234	207	181	157	144	224.3
Retort No. 1	267	244	229	206	181	160	146	135	200.0
Bench No. 36—									
Retort No. 3	336	325	300	272	241	204	170	151	250.0
Retort No. 2	317	298	278	254	230	199	171	149	236.7
Retort No. 1	289	264	248	229	206	185	157	138	214.0
Bench No. 43—									
Retort No. 3	325	309	285	258	229	207	181	151	243.0
Retort No. 2	316	300	279	252	225	197	172	146	229.0
Retort No. 1	294	271	250	227	208	172	149	137	212.7
Bench No. 44—									
Retort No. 3	349	319	291	261	221	192	165	138	241.8
Retort No. 2	345	324	310	281	249	215	180	146	255.6
Retort No. 1	309	286	267	244	211	181	160	137	221.2

To complete these observations by data from other sources, I copy from the London *Journal of Gas Lighting* of June 4th, 1878, one of a series of three tests published by Mr. T. A. Collinge, Gas Analyst to the Corporation of Manchester.

Temperature in Ascension Pipes, Manchester Gas Works.

Charge, 280 pounds, in 6 hours. Wigan Arley Coal.	Time of Observation after Charging.					
	5 M.	1 H.	2 H.	3 H.	4 H.	5 H.
	Deg.	Deg. High'r than	Deg. High'r than	Deg. High'r than	Deg.	Deg.
At 3 feet above mouthpiece	320	640	640	640	380	380
At middle of pipe	210	360	378	380	220	196
At top of pipe	160	199	200	199	120	115

From the same *Journal*, May 28th, 1878, the following observations, by Mr. Charles Hunt, of Birmingham, are taken—

Temperature in Ascension Pipes, Birmingham Gas Works.

Charge, 253 pounds. Six hours.	Time of Observation after Charging.							
	5 M.	30 M.	1 H.	1½ H.	2 H.	2½ H.	3½ H	6 H.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
18 inches above mouthpiece	248	260	270	274	280	290	282	280
4 feet 6 inches above mouthpiece	154	168	164	150	140	135	125	115

Finally, I must add the following series, determined from curves of temperature accompanying M. Rouget's last paper before referred to. I have selected the hottest retort.

Temperature in Ascension Pipes, Brest Gas Works.

Charge, 4 hours. Weight not given.	Time of Observation after Charging.						
	0 M.	30 M.	1 H.	1½ H.	2 H.	2½ H.	3 H.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
6 inches above mouthpiece	482	509	542	500	473	392	377
6 feet above mouthpiece	212	221	190	180	169	140	122

These temperatures are all lower at equal distances from the mouthpiece than those found in our works, and they also differ in this, that the maximum is not reached until one or two hours after charging. Lower retort heats will account for these discrepancies in the English results; and the free distilling qualities of the Pittsburgh coals, compared with the more refractory French coals, will explain them in the Brest series.

Summing up, now, the facts of our New Orleans experience we find:

1st. Constant freedom from stoppages in the pipes of four retorts out of six in every bench, under similar conditions of heat, charges and temperature in all the pipes.

2d. Complete immunity of every retort in certain benches on both sides of the range, while the upper retorts of neighboring benches are frequently stopped.

3d, Comparative freedom from stoppages of south side benches.

4th. Great frequency of stoppages in winter and cessation in summer.

The remedies which we have tried exhaust, I think, the whole stock of specifics proposed to cure the evil, except Mr. Malam's elaborate arrangement. The list is a long one.

1. The catch shield or diaphragm in the mouthpiece.
2. External application of water in jets to the surface of the ascension pipes, as patented by Mr. Shiras, of Sharon, Pa.
3. Water jackets through which a constant flow is maintained.
4. Steam jets, large and small, constant and intermittent, above, below and at mid-height of stand pipes.
5. Internal water jets, as practised by Mr. Wood, until the cooling effect cracked several mouthpieces, and the water lay on the mouthpiece floor.
6. Extra weights of coal in retorts. This was effective only by lowering the heats and greatly reducing the yield of gas.
7. Lengthening the ascension pipe five feet. This brought down the temperature in the bridge pipe to 252° at the beginning of the charge; but a stoppage in the bridge pipe immediately followed the change.
8. A thin wrought iron stand pipe was tried; but on the fourth day it became so completely choked that it could not be cleaned, and it was taken down.

None of these remedies afforded desirable relief, although carefully, patiently and perseveringly applied.

3.—*What is the True Cause of the Stoppages?*

Before discussing the conflicting theories of the genesis of stoppages, we must discriminate between them. The hydrocarbons which obstruct the pipes vary greatly in their physical properties under different circumstances and in different parts of the same pipe. They may be divided into three categories: (1) Hard, stratified, graphite-like material, adhering closely to the whole interior surface of the stand pipe proper. This accumulates principally above the highest point reached by the clearing auger used regularly between the charges, and forms the most difficult obstruction to remove. (2) Thick, pasty, tough pitch, which balls together under the tools and drops out in large lumps. This is the most frequent obstruction in our works, and is formed equally in stand, bridge and dip pipes, and even in the hy-

draulic main. (3) Dry soot or granular lamp black. The stoppages from this material are sudden, and rapidly become total. They occur a short time after the retorts are charged, and may extend as far as the dip pipe. They are very easily removed. Sometimes all three of these characteristic products are found in the same pipe; but, generally, the nature of the stoppage is determined by the predominance of one or the other of them.

It is agreed on all hands that stoppages of any kind occur only when the retorts are highly heated. The first cause, therefore, is in the retort efficiency, and only with the secondary causes must we deal. We can also dismiss from further consideration the dry obstructions of soot, as this substance, when once produced in the retort, is not amenable to change, and must be dropped somewhere in the pipes, unless we trap it in the mouthpiece, on screens and gratings.

The first and second class of stoppages, to which alone preventive treatment outside of the retorts can be applied, may be discussed together. The opinion generally held, as expressed in the papers reviewed, is that they are produced in consequence of the excessive heat in the ascension pipes, by distillation into pitch of the condensed tar which flows down their surface, until successive layers close the pipes. There are two theories of the source of the heat by which this distilling process is performed. Messrs. Somerville, Malam, Brémond and others believe that it is in the metal pipe itself, while M. Rouget asserts that the heat which cooks the tar is that of the ascending stream of gas and vapors. The distinction is important, for the temperature of the pipes does not rise to the high degree reached by the current inside of them, except possibly just at the mouthpiece. At the height of seven feet nine inches from the mouthpiece, we found the difference, at progressive periods of the charge, to be as follows:

Time after charging.	5 M.	30 M.	1 H.	1H.30M.	2H.	2H.30M.	3H.	3H.30M.	4H.
Temp't're of pipe	176°	225°	241°	234°	219°	180°	163°	158°	153°
" inside of do.	469°	459°	428°	388°	327°	286°	235°	194°	

From this it appears that the ascension pipe gradually becomes heated by the ascending products of distillation from the retorts, reaching its maximum temperature an hour after charging, then steadily grows cooler to the end of the charge.

If the production of stoppages be due to excessive heat in the ascension pipes, the source of heat must, therefore, be the up-rushing vapors themselves. The theory then, if true, would explain and account for stratified stoppages only, of the first class, occurring in the stand pipe proper, where the heat might be sufficient to distil such material. And if such be the only cause then would all stoppages be of that character and limited extent. Every ascension pipe, under approximately equal conditions, would possess the same tendency to stoppage; for this formation of pitch from tar on the surface of the pipe would be a mere question of time in any bench with tolerable heats. But we are told that in Paris, when the heat was confined in the mouthpieces and ascension pipes as far as the hydraulic main, no stoppages took place in them, but that pitch was formed in the main. In New Orleans, as I have said, we have very few stoppages in summer, when the pipes are hottest, and in winter they are much less frequent on the south side benches; while there is perfect immunity in the four ascension pipes of every bench that are most exposed to the radiation from the brickwork, and the internal temperature of which is as high as that of the two which become stopped.

From these considerations I am tempted to believe that the reverse of this theory is true; that, instead of excessive heat, it is the comparative coldness of the ascension pipes which determines the formation of these obstructions in them.

It appears to me probable that, under certain conditions of coal and high retort heats, a series of hydrocarbon vapors may be produced in the early stages of the distillation which solidify upon contact with the relatively cool surface of the ascension pipes; and, further, that in order to effectually prevent stoppages from this cause, these vapors must be completely intercepted in the mouthpiece itself. This could be effected by cooling the mouthpiece to that point only which will determine the condensation within it, in a liquid form, of all vapors which solidify on their passage to the hydraulic main; but, at the same time, leaving the ascension pipes to retain their normal heat, so as to allow the greater portion of the tar vapors to pass over to the hydraulic main. Perforated diaphragms or gratings in the mouthpieces would assist in this condensing process, as well as entrap the soot deposit.

I present this theory with diffidence, as it has occurred to me only since I have grouped together the materials of this paper, and I have as yet had no opportunity to put it to the test of actual practice; but I think the Paris results with hot ascension pipes conclusive against the opposite doctrine, while, taken in connection with the failure of cooling ascension pipes in our works, they go very far towards confirming the view just advanced. On this assumption it would follow that the partial relief afforded by such remedies as vessels of water, wet breeze, wire screens, etc., is not complete; because, although right in principle, they but imperfectly fulfil the end of condensing the obstruction-producing vapors, while the great benefits which in many cases have followed the cooling treatment applied to the ascension pipes, have been the consequence of a simultaneous and indirectly produced cooling of the mouthpiece itself sufficient to accomplish the result.

In our own case the various cooling appliances to the ascension pipes produced rather an aggravation of the stoppages; but their influence did not reach down to the mouthpiece, except when internal water jets were used, and in that instance the cooling effect upon the mouthpiece was confined to its floor upon which the water dropped directly from the stand pipe. If any member of the Association has a knowledge of any facts which will tend either to confirm this view, or to explain away the apparent contradiction involved in the theory herein controverted, I shall be glad that I have brought up the subject, even while I crave your forgiveness for having taken up with it so much of your time.

The reading of the paper was greeted with applause.

Discussion.

The President—It is not necessary, I am sure, for me to say that the paper to which we have just listened is a most able and interesting one. It invites the most careful scrutiny and the most thorough discussion. I hope every member who has anything to say upon the subject so ably presented by Mr. Forstall will not hesitate to express his views. Perhaps Mr. Wood will give us the benefit of his experience.

Mr. Wood, of Syracuse—I do not claim any prestige over anyone else who has anything to say upon this subject. Mr. Forstall has alluded to a paper that my son read upon this question before the Central New York Gas Light Association, which paper has been published with the proceedings of that Association in the American Gas Light Journal. The paper was written some five or six, or, perhaps, seven months after we began the use of the internal application of water to the stand pipes. For the succeeding twelve months since that time our experience has been as related in that paper. Instead of having 1005 stoppages of stand pipes in sixty days, we have not had five stoppages of the stand pipes within this whole time. I think the great trouble with Mr. Forstall was that he used too much water. It only requires a very little—just the continuous dropping of water.

Mr. Forstall—We graduated that very carefully. We began with a little, and increased the quantity gradually.

Mr. Wood—That has been our experience in relation to this process. We have no stoppages of stand pipes. We do not know what it is in our works. We have had no broken mouthpieces, no broken stand pipes, or any results of that kind. Care is taken after the charge is drawn from the retort, and before putting in another charge to clean out the mouth of the stand pipe. We have a tool made expressly for that purpose, as related in the paper, which the members of the Association will probably remember. It is at that point only that there is any stoppage—just as the stand pipe leaves the mouth piece. The round tool that we use just fits the internal diameter of the mouth of the stand pipe. It is circular in form. With that tool we clean out the mouthpiece before putting in the charge.

If that is done I do not think you will have a single stand pipe stopped in your retort house.

We run our heats as high as possible. Our retorts are all one size, 12 by 24, or, more correctly speaking, 12 by 23. We endeavor to get the retort makers to make them 12 by 24 internal diameter; but it is almost impossible to get them to put on the extra inch. For some reason or other they insist upon making them 12 by 23. The retorts are nine feet long. We burn in these retorts from 1600 to 2000 pounds of coal every twenty-four hours. In the bench of retorts we are now running, we added on the half brick to the front of the bench, as described by Mr. Forstall, making it a brick and a-half, and leaving half an inch air space.

The stand pipes and the bridge pipes are cooler, by reason of that additional half brick and the air space between. If Mr. Forstall will carefully read over the paper that my son wrote at that time, describing our experience, he will find very great relief. We have tried the increased thickness of the wall of the front bench, and have also put up shields of iron plates. If he will introduce on the inside only that small quantity of water that I referred to—just a continuous dropping—he will find that the water, converted into steam, keeps the whole thing moist. The dry carbon that he complains of is so moist that he will find it there as I have stated. The moment he slacks off the lid he will find that the water is still dropping down in the mouthpiece a little. Our experience has been continued for twelve months after we commenced using the process. I do not think we have had five stand pipes stopped during the whole time we have used the water. Before that there was, as my son and Mr. Forstall have described, a continuous stopping of stand pipes.

I do not think we have had the experience of the difference in the stoppage of the stand pipes in summer and winter that Mr. Forstall speaks of. I think we had it just as much in the summer time, running down sometimes to 18 in the summer time, and up to 48 or 54 in the winter, and 60, at times. I should recommend Mr. Forstall to read over the paper carefully,

and follow the process therein described. If he does I think he will find, as we did, great relief.

Mr. Starr—What is the size of your stand pipes?

Mr. Wood—Six inches. The mothpieces are 12×20. New mouthpieces that I am just putting in are 12×24. We have had, during this time, a few stoppages in the bridge pipe. Previous to using the water inside of the pipe we had them very frequently; then they would be as often in the bridge pipe as in the stand piper.

You will find, in this application of water, that there will be a collection of this dry carbon which will perhaps be down all around on the inside of the mouthpiece just where the stand pipe comes out. With this round tool that I have described, just fitted to the inside diameter of the stand pipe, you clean that out well. It seems to collect at that point. I presume, from that, that the water evaporates or turns into steam before it gets down to that point. It would be below the hub of the mouthpiece, close down to it, and there it would be at times pretty hard, but not hard enough to shut off the mouthpiece entirely so as to necessitate slacking off the the tid to clear it away. I do not think, within the last nineteen or twenty months, we have had five stoppages of stand pipes in our works.

Mr. Forstall—I hope Mr. Wood does not think that I doubt at all; but that the result in his works has been precisely as he has stated.

Mr. Wood—Not at all.

Mr. Forstall—I merely believe that the good results in his works were brought about, not by cooling the stand pipe, but that, indirectly, by cooling the ascension pipe, he cooled the mouthpiece, and that the cooling or non-cooling of the ascension pipes had nothing to do, directly, with the result.

The experiment, in our works, has been tried exactly as he tried it. We had used these water jets after a fashion of our own. After reading the paper published in the Gas Light Journal, I took pains, in order that there might be no question as to the manner in which the water had been applied, to exactly follow Mr. Wood's directions. The tool that he mentions we have been using for years; It is a circular chisel which fits exactly the bore of the pipe. I can assure you that the failure in our case has not resulted from any careless use of the prescription. I did what I always do when I call in a physician—exactly what I was told to do. But in this case the symptoms were not at all relieved. I attribute this failure to the fact that possibly our heats approach the mouthpiece a little nearer than they do in his works. Our mouthpieces are rather shallow. There is very little space between the stand pipe and the brick work. So I suppose that in our case the indirect action upon the mouthpiece was not sufficient. It was then that I tried the experiment of turning on more water. The consequence was that the bridge pipes and the dip pipes were stopped; also that portion of the ascension pipe directly above the jet of water. I should like to know whether Mr. Wood has any stoppages in the dip pipes in his works.

Mr. Wood—No, sir.

Mr. Forstall—Do you have any pitch in your hydraulic main?

Mr. Wood—None at all.

Mr. Forstall—We have very thick tar, and often even pitch, although our main is pretty well elevated above the bench.

Mr. Wood—Our main is about three feet above the bench. It is cool enough to put your hand upon it. It rarely gets into pitch in our main. We have very thick tar; it troubles us somewhat at times to carry it off by the tar well. We have no trouble, however, and no stoppage in our dip pipe. I suppose the water, while the lid is on, does not get quite down to the mouthpiece. I think the quantity we put in there is evaporated or turned into steam before it reaches the mouthpiece. I judge that to be so from the incrustation that is found immediately at the entrance of the stand pipe. It is enough to keep it soft, so that sometimes when we slack the lid off there will be quite a quantity of moist thick tar running down the mouthpiece, which we scrape off.

Major Dresser—What is the character of the stoppage where you find it, Mr. Wood?

Mr. Wood—It is usually very hard, dry, carbon, burned on to the inside of the mouthpiece and at the entrance into the stand pipe. Our mouthpieces are, I think, about the usual depth—twelve inches—and our stand pipes five or six inches.

The President—Perhaps the use of your coals may help to explain the difficulty.

Mr. Forstall—We use Penn or Pittsburgh coal.

Mr. Wood—We use Youghiogheny and Westmoreland Pittsburgh coal.

The President—I made the remark because we attempted to use a certain coal that we thought perhaps might prove to be good gas coal. We knew it was rich in gas, and we thought it might turn out to be very good and very cheap; but instead of distilling tar it distilled pitch. It stopped everything. We were obliged to stop using it, because it stopped us. It may be that sometimes the difficulty that you speak of arises from the use of coal that in itself has a tendency to produce pitch. I thought it might help matters some if you came to an understanding as to the kind of coal you used.

Mr. Wood—We are both using about the same kind of coal. Mr. Forstall speaks about the heat coming out of the front of the bench. The setting that we use is an open setting, one of our own device, and, perhaps, a little peculiar to ourselves, but not differing very much from the ordinary open setting. With that setting we heat our retorts well up to the mouthpiece. It was quite a relief to the men from the heat in charging, especially in the summer time, when I added that brick and the half inch air space. Our benches are well heated out to the front, and with our setting we could not observe any difference in the stand pipes as between the lower and upper retorts. We did not have the experience that Mr. Forstall relates. Our retorts face to the east, and that may make a difference.

Mr. Forstall—The prevailing wind may have something to do with it, as well as the direction in which the retorts face. We have an extra thickness of wall, thirteen and a-half inches, but we have not put in sheet iron between the brickwork and the stand pipe. That may help to prevent radiation to the mouthpiece. When I spoke of heat coming forward on the mouthpiece I had reference to radiation. In your case you may have kept your mouthpiece cooler by preventing the transmission of heat from your brickwork. The ascension pipes that we have are fourteen feet ten inches long. We have added several feet to their original length, and have since that kept down the heat of the pipes.

Mr. Wood—There is one thing that has aided somewhat in keeping the thick tar or pitch from our mains and, perhaps, from our bridge and dip pipes. I do not know what the experience of others may have been in that direction; but in resetting our benches (we have two sets of seven benches each) we use up one bench entirely, or calculate to, before repairing it. At that time we take off the end plates from the main, and the stoppers out of the stand, bridge and dip pipes, and give them a thorough cleaning.

Mr. Forstall—We do that every Sunday. We clean out our hydraulic main from one end to the other, and we clean out every stand, bridge and dip pipe regularly. The Sunday work of cleaning out these stoppages is not included in the figures I have given. It is only the stoppages between times that I have made a record of here. In the old retort house the hydraulic main was laid close to the brick work, and the coarse cinders were almost on a level with it. The bricks were almost red hot, and it was impossible for a man to walk on them; but the main was free from pitch. There was no thick tar in the main, nor a stopped bridge pipe, nor a stopped dip pipe, nor delay on account of a stopped ascension pipe, and it is possible that, in that direction, we may find the cause of the stoppages.

Mr. Wood—We have, perhaps, a greater thickness of brickwork on top of our retorts, and between them and the hydraulic main, than that. It is seldom that they are red hot. They never get so hot as Mr. Forstall stated his did.

Mr. Forstall—Those were the old benches. In our new benches we have three feet of brick work above our retorts, and a man can walk on the brick without any inconvenience at all.

Mr. Ludlam—I would like to ask Mr. Forstall if he ever tried putting in a vessel of water in the mouthpiece. I have heard of that being done.

Mr. Forstall—Yes; as far back as 1871 we used a patent lid, invented by Mr. Jones, of South Boston. It was a casting with a cup on the inside for holding water. In those days our stoppages were so few that it was no object for us to adopt any special means for preventing them. After we made changes in our retort house, we tried a similar plan, but we did not find relief from it. We have tried all sorts of vessels, from one gallon up to five, but have derived no apparent benefit from them. The trouble was that wherever there was any benefit immediately due to the use of water, the stoppages would all take place beyond the point where it would be effective. In some cases it is quite possible that a vessel of water will do good, and afford relief, but it did not in our case.

Mr. Starr—Would not the difficulty be obviated by the use of large stand pipes? In my own case I first put in four inch stand and bridge pipes. They used to stop frequently, and I had a great deal of trouble with them. Sometimes we had to take off the lid and clean them out, and sometimes we had to burn them out. The next season I put in seven inch stand pipes, and after that we had very little trouble. We are now using eight inch stand pipes and seven inch dip pipes, and they have not been stopped more than, perhaps, two or three times in two or three years. Two or three years ago I was considerably alarmed at the position I found myself placed in. I found my hydraulic main filled to the top with pitch. I did not know what to do with it. Finally, I took it all out and built a loose wall of brick along the top of the bench, underneath the hydraulic main, and about one foot above the bench. I filled it with these clay cinders that Mr. Forstall speaks of being on top of the bench clear up to the main. I have never had any pitch in my hydraulic main since. Mr. Wood speaks of cleaning the bottom of the stand pipe with an instrument made for that purpose. I never charge my retorts without using it. If there is any accumulation of dry carbon there, which there seldom is, it is but a moment's work to clear it away. We do not have anything above five inches from the mouthpiece. I give the credit of my freedom from this to the lower stand pipes, and I do not think that anything less than eight inches should be used.

[To be continued.]

THE AMERICAN GAS LIGHT JOURNAL AND CHEMICAL REPERTORY

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TUESDAY, NOV. 2, 1880.

Official Report of Examinations of Gas for two Weeks ending Oct. 23, 1880, made at the Photometrical Room of the Department of Public Works.

Corrected Illuminating Power.

1880. Oct.	Time of Day at which Test were made.	New York Gas Light Co.	Manhattan Gas-Light Co.	Mutual Gas-Light Co.	Metropolitan Gas-Light Co.	Harlem Gas-Light Co.	Municipal Gas-Light Co.
		†	*	†	‡	*	†
11		24.72	19.45	26.84	22.45	18.59	28.98
12	Between	23.73	19.55	27.40	22.55	19.41	29.74
13	9.30 A.M.	23.27	18.51	27.25	21.10	18.24	30.50
14	and	22.70	18.09	24.34	21.13	18.41	27.32
15	1 P. M.	24.29	18.63	24.81	21.90	18.58	28.31
16		24.45	19.16	26.77	22.35	19.17	28.67
	Average	23.86	18.85	26.23	21.91	18.72	28.92
18		24.32	19.00	26.69	— — —	— — —	28.75
19		22.53	18.20	24.27	21.81	18.38	28.87
20		23.11	18.51	25.21	21.58	18.74	29.20
21		23.92	19.80	25.91	21.46	19.15	28.68
22		24.76	18.59	24.08	21.57	18.80	29.37
23		23.92	19.72	25.40	21.46	18.20	29.94
	Average	23.76	18.97	25.26	21.56	18.65	29.13

* Five foot lava tip with check.
† Bray's slit union, No. 7.
‡ Bray's slit union, No. 6.

E. G. LOVE, Gas Examiner.

An error occurred in the figures giving the illuminating power of the gas furnished by the Municipal Gas Light Company for the week ending September 18th. The average for the week ending with that date should have been 28.88 instead of 21.10.

Death of Samuel Watkins President Nashville Gas Company.

At a called meeting of the directors of the Nashville Gas Light Company, the following preamble and resolutions were adopted:

It is with feelings of profound sorrow that we have assembled to pay our tribute of respect to the memory of our late worthy President, Mr. Samuel Watkins.

It is not our intention to attempt a sketch of his life, as the main events of his career have already been publicly recited elsewhere, but to give our testimony to his great moral worth, his usefulness as a citizen, a philanthropist and especially as President of the Nashville Gas Light Company.

Mr. Watkins has been connected with the gas company in the capacity of stockholder since its first inception, and he was elected President in 1862, and has faithfully administered the office ever since.

We, who have been so long associated with him in the Board of Directory, can bear witness to his great zeal, tempered with moderation, and to his unerring judgment in all matters pertaining to the interests of the company.

In the private walks of life, his character shone with the brightest lustre, a good citizen, an upright man.

His private charities were numerous, unostentatious and judiciously bestowed, while in schemes for public good it was his habit to set down "tens where others units wrote."

SAMUEL PRICHITT, Chairman.
T. F. KENDRICK, Secy.
NASHVILLE, Oct. 9, 1880.

The Petroleum Outlook.

The statistics which we present to our readers for September justify the prediction which we made four months ago. Notwithstanding the most active work in the producing field, under the most favorable influences of good weather, plenty of money, and the certainty of getting oil in the regular districts, the production has, beyond doubt, reached its height, and is on the decline.

From the most accurate information that we could obtain from all available sources, we place the daily average production for September at 68,501 barrels, a decrease of 1,087 from the daily average of the preceding month.

In the present plentitude of money, this stock seems to be more easily carried and held than the much smaller stocks were in the past; and it is to be expected that, as holders come to realize the permanency of the decline in production, by the limitation of the field, and in spite of the energy of the producers, these stocks will be more firmly held than we have ever yet seen them.

The average market price of oil at the wells for the month was 96 cents, which is four cents higher than the average of the preceding month.

Comparing the first nine months of this year with the corresponding nine months of last year, we notice that the average market price of oil at the wells for last year was considerably lower than the average for the present year.

The Stoneham district has not borne out the sanguine hopes of the proprietors, nor have the hopeful producers' predictions, with reference to the Wellsville territory, been verified. The Stump Creek region has proven to be an entire failure; and the Bradford field is now regarded as very clearly defined in all directions.

The number of pumping wells within the district is gradually increasing, thus showing a weakening of the gas, which also, of course, means a weakening of the oil.

Manipulations of the market may create intermediate and temporary spurts or depressions, but in the long run the laws of supply and demand must prevail, and appearances greatly warrant the conclusion that the long season of very low prices is slowly but surely passing away. Taking all the factors at our command into consideration, we are encouraged to express the confident belief in a gradual and permanent appreciation of prices in the near future.—*Stowells Petroleum Reporter.*

Prices of Gas Coal.

The following are the prices at which the companies mentioned are shipping coal:

	New York.	Baltimore.	S. Amboy
Penn.....	$5.25	$4.10	$4.80
Scott's Youghiogheny..	5.00	3.75	
Montauk.....	5.00	3.70	
Newburgh Orrel.....	5.00	3.75	
Tyrconnell	5.00	3.75	
Despard.....	5.00	3.75	
West Fairmount.....	5.00	3.75	

To give some idea of the relative prices at the East and the West we give the following quotations of coal furnished by the Fort Pitt Coal Company:

At Pitsburgh, f.o.b. cars....	$1.30	per ton of	2000 lbs.
At Cleveland, f.o.b. cars....	2.90	"	"
At " f.o.b. vessels	3.05	"	"
At Buffalo, f.o.b. cars..	3.55	"	"
At Chicago, f.o.b. cars	3.60	"	"
At Indianapolis, f.o.b. cars.	3.00	"	"

Gas Stocks.

Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.
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34 PINE STREET, NEW YORK CITY.
NOVEMBER 2, 1880.

☞ All communciations will receive particular attention
☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid.	Asked
Gas Co.'s of N. Y. City.				
Central.....	466,000	50	60	70
Harlem.....	1,800,000	50	70	75
" Bonds	170,000			103
Manhattan.....	4,000,000	50	178	183
Metropolitan.....	2,500,000	100	130	137
" Scrip...	$1,000,000	...	106	104
Mutual.....	5,060,000	100	70	75
" Bonds, gold	900,000	1000	100	104
Municipal.....	1,500,000	100	170	180
" Bonds	750,000		108	110
New York.....	4,000,000	100	104	106
Northern.....	270,000	50	—	100
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	110	112
Citizens.....	1,200,000	20	60	65
" S. F. Bonds.	320,000	1000	100	105
Fulton Municipal.....	1,500,000	100	70	80
Peoples.....	1,000,000	10	35	38
" Bonds.....	290,000	...	90	95
" Scrip	250,000	...	75	85
Metropolitan.....	1,000,000	100	60	63
Nassau.....	1,000,000	25	40	50
" Ctfs.....	700,000	1000	85	95
Williamsburgh	1,000,000	50	65	70
" Bonds		...	98	103
Kings Co.....	135,000	100	60	70
" Bonds.....	40,000	—	—	—
Richmond Co., S. I.	300,000	...	75	80
Out of Town Gas Companies.				
Buffalo Mutual, N.Y	750,000	100	75	80
" Bonds	200,000	1000	95	100
Citizens, Newark.....	918,000	50	85	90
" " Bds.	124,000	—	105	10
Chicago Gas Co., Ills			125	—
Cincinnati G. & C. Co.				190
Consolidated, Balt.			84	85
" Bonds....			109	110

East Boston, Mass...		25	114	120
Hannibal, Mo.....	100,000	100	95	100
Hartford, Conn.....	700,000	25	140	144
Hempstead, L. I....	25,000	100	...	—
Halifax N. S.....	400,000	40	148	150
Hamilton, Ontario...	150.000	40	117½	
Jersey City	750,000	20	150	160
Jamaica, L. I.....	25,000	100	...	—
Jacksonville, Ill.....	120,000	50	100	...
Lewistown Maine...	400,000	100	70	80
Laclede St Louis Mo.	1,200,000	100	110	112
Montreal, Canada....	2,000,000	100	148	149
New Haven, Conn...		25	140	150
Oakland, Cal.....			35	36
Peoples, Jersey City		...	85	90
" " Bds.				5
Pittsfield, Mass.....			120	130
Rochester, N. Y.....		50	70	80
" Citizens		100	30	35
Rondout & Kingston			75	80
St. Louis Missouri..	600,000	50	250	254
Stillwater, Minn.....	50,000	50	—	26
Saugerties, N. Y	15,000	100	95	100
San Francisco Gas-Co., S. Fr'isco Cal.			77	79
Toledo, Ohio..... . .			95	97
Troy, Citizens..	600,000	100	—	—
Washington, D. C...	1,500,000	20	200	215
" Scrip	500,000	20	125	—
Woonsocket, R. I....	150,000	100	80	...
Wilmington, Del....		50	174	...
Yonkers.....		50	—	70

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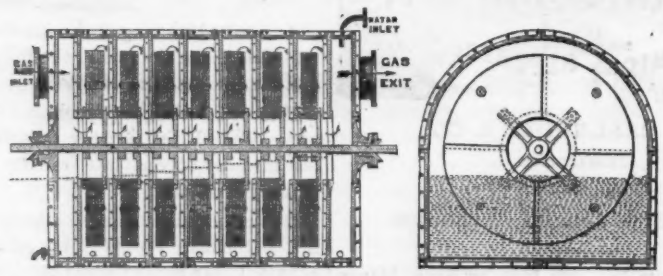

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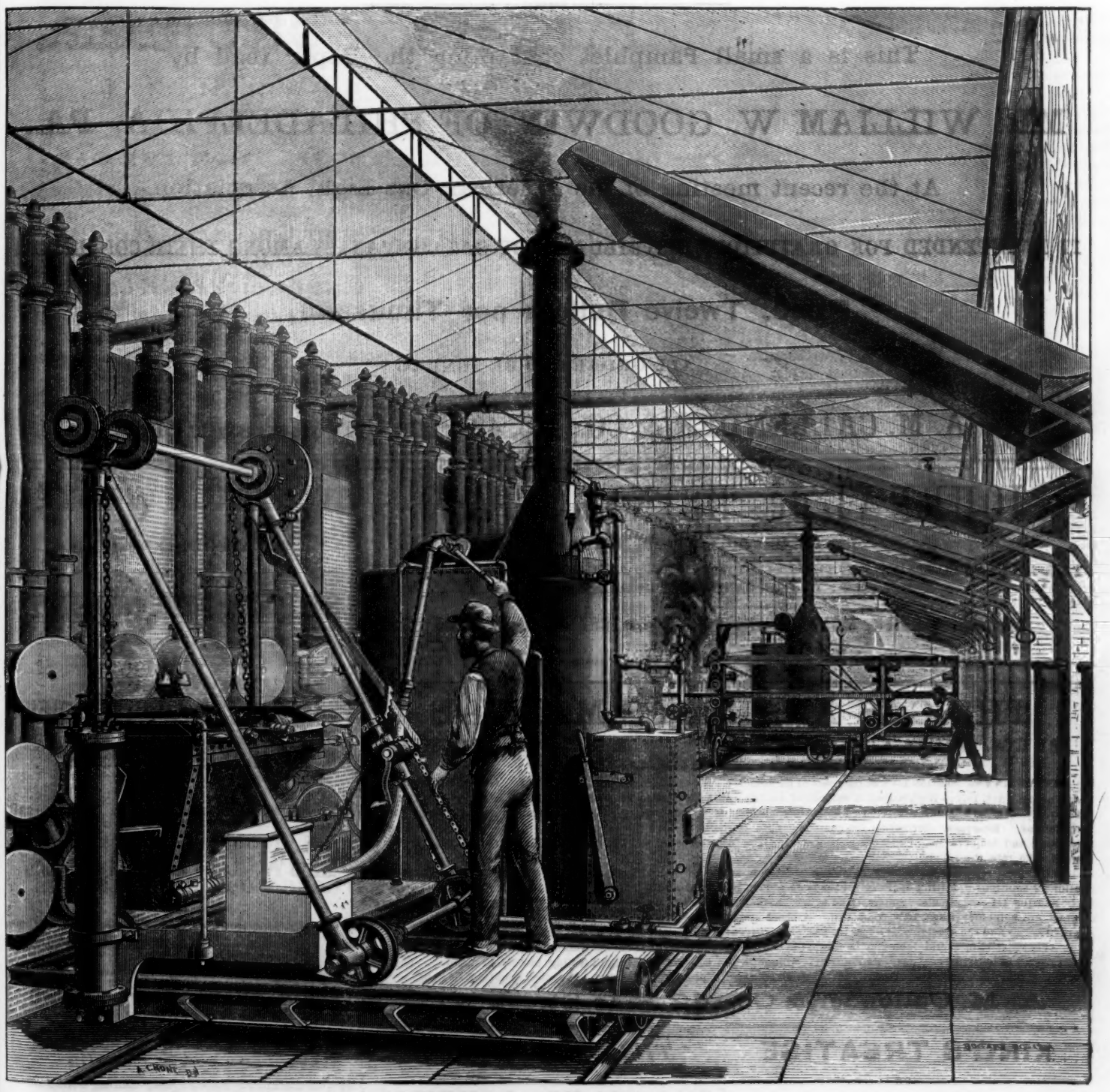

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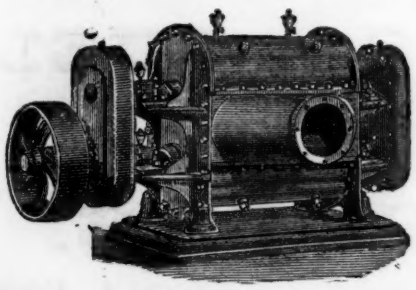

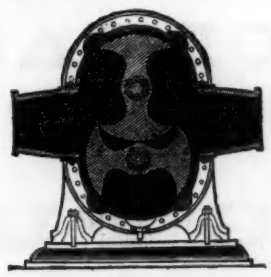

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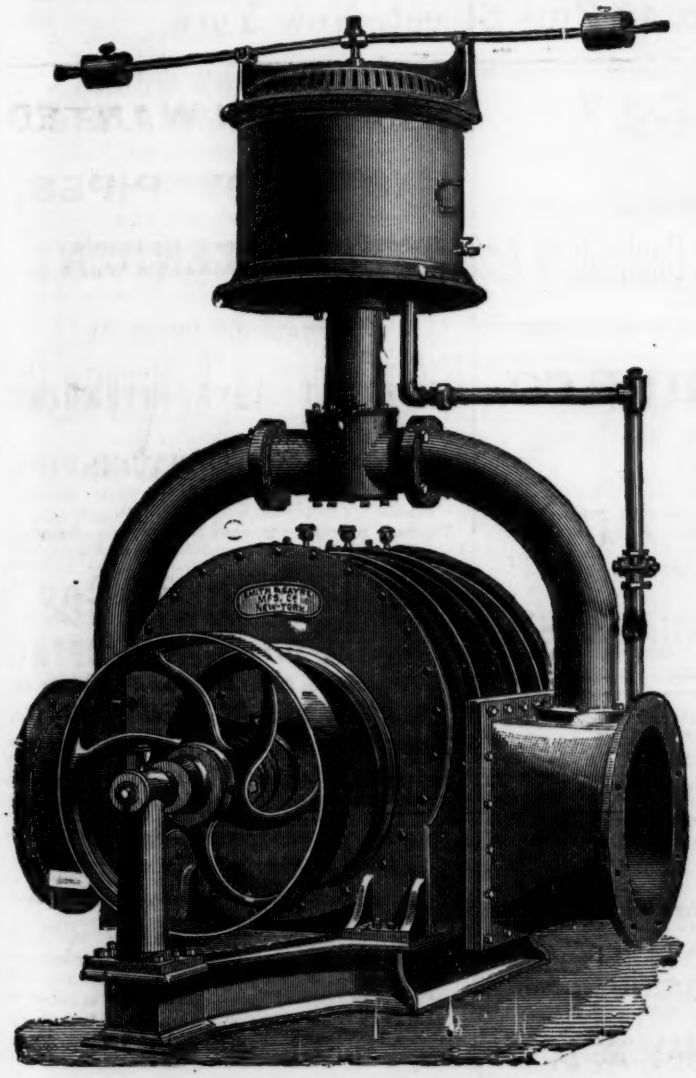

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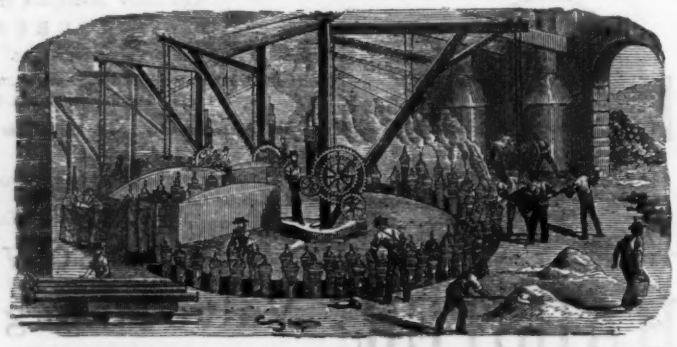

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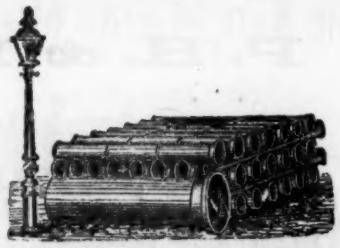

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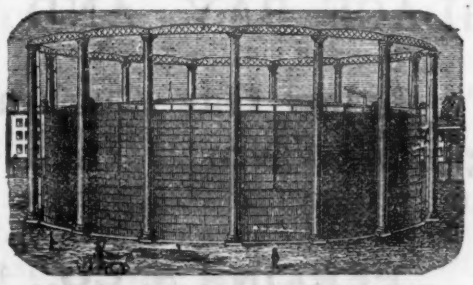

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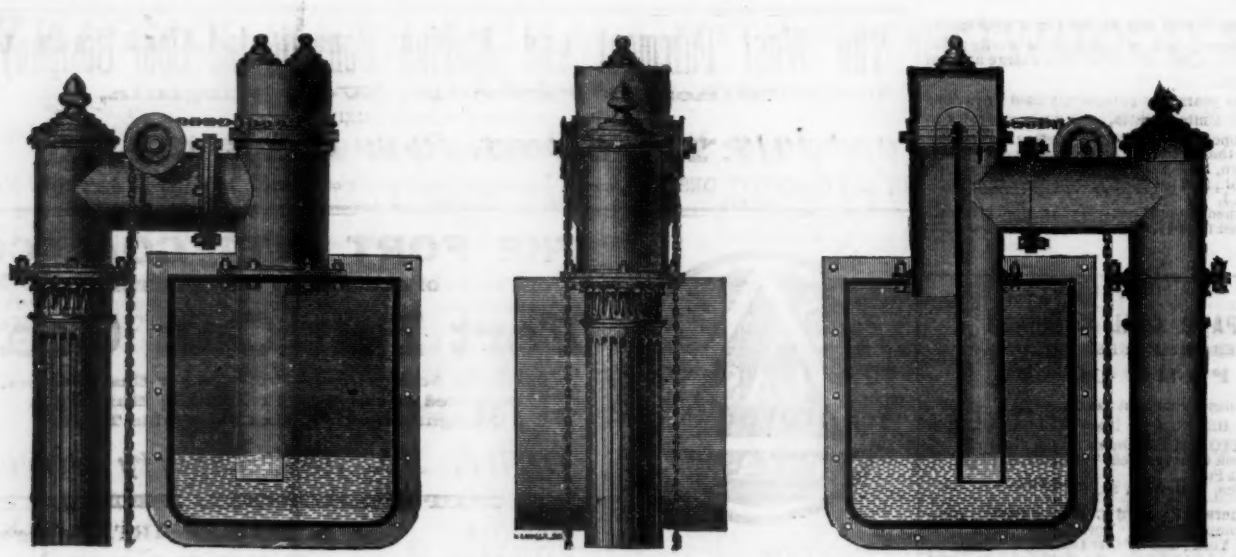

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